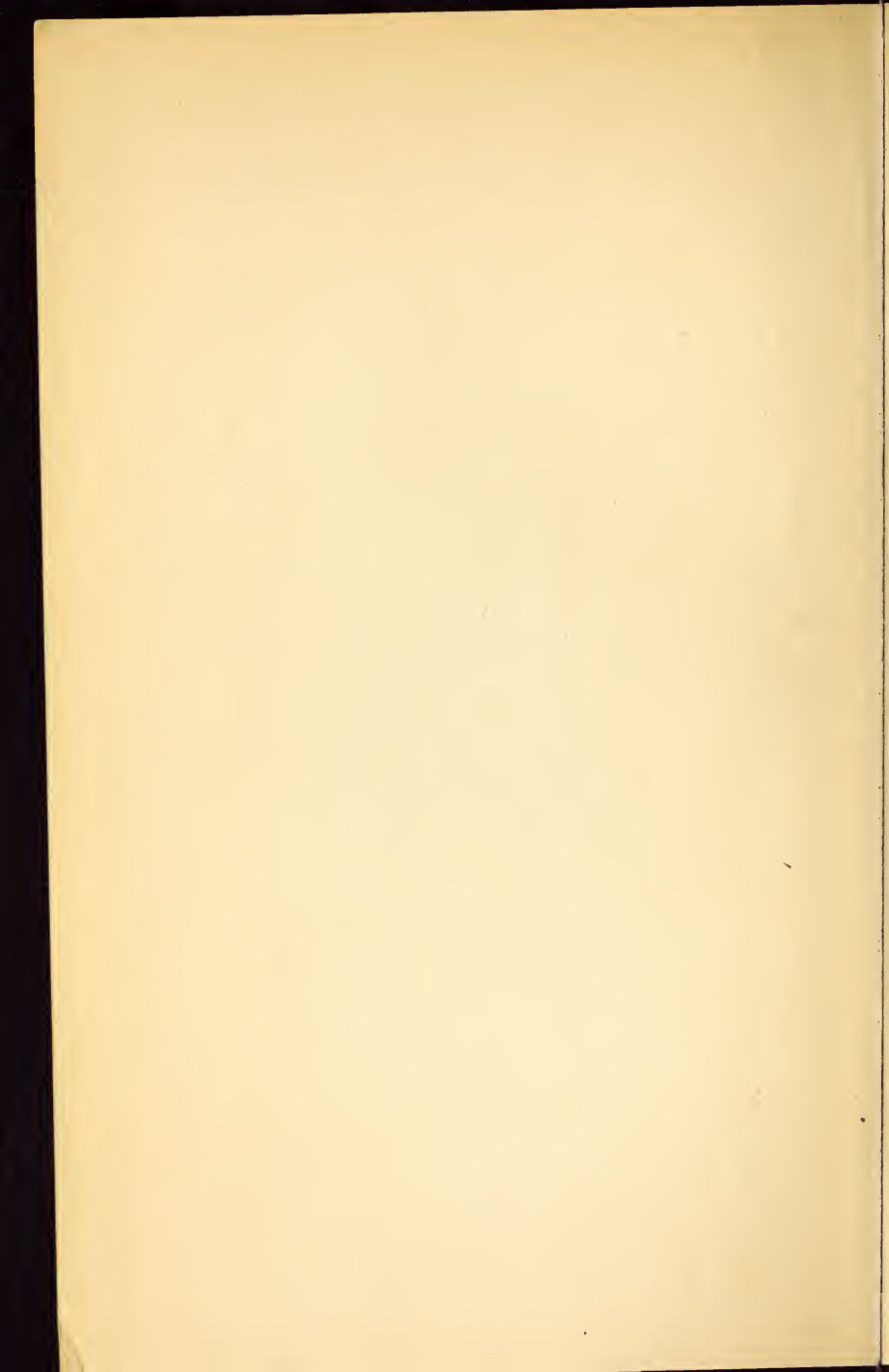


THE PSYCHOLOGY OF
EXCEPTIONAL
CHILDREN
BY
SCHEIDEMANN



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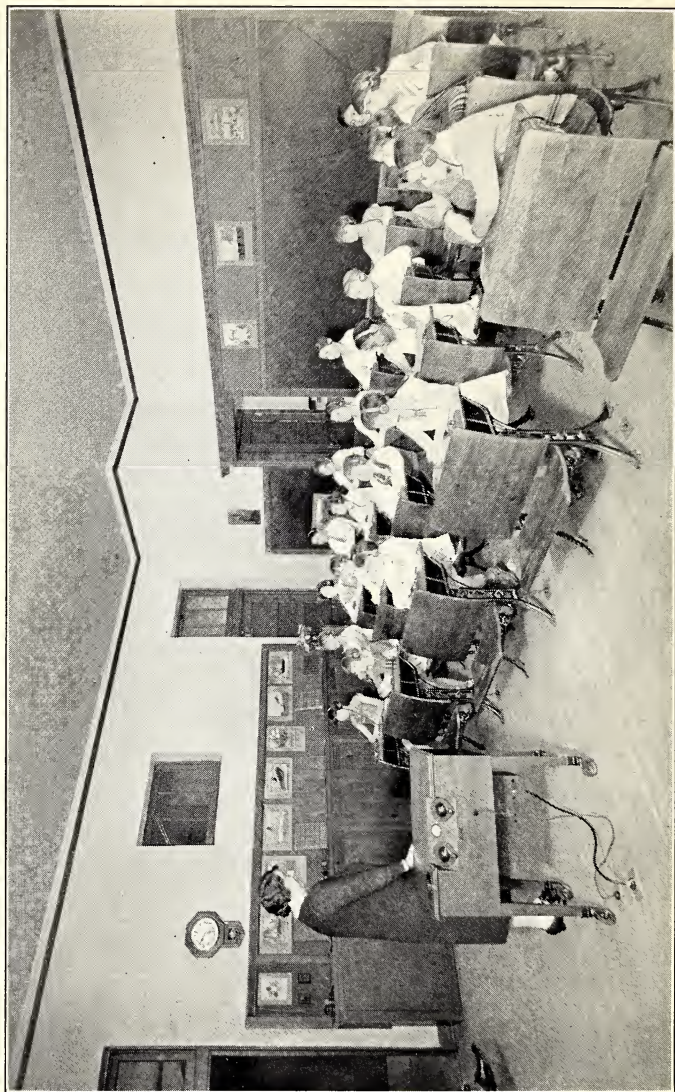
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IN EDUCATION**

EDITED BY ELLWOOD P. CUBBERLEY

**DEAN OF THE SCHOOL OF EDUCATION
LELAND STANFORD JUNIOR UNIVERSITY**







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THE PSYCHOLOGY OF EXCEPTIONAL CHILDREN

BY

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TO
MY MOTHER



EDITOR'S INTRODUCTION

THE more we study children the more diverse their educational needs appear to be, and the variations among them in their capacity for school work which scientific studies have disclosed — variations due either to hereditary or to acquired abilities or defects — have only emphasized the need for differential and remedial care for many of them. That there are thousands of children in our schools today who are realizing but a small percentage of their educational possibilities, every intelligent educator knows. There are various reasons for this situation, chief of which is that we do not put enough money on their education, and do not specialize their instruction sufficiently, and, as a result, we are wasting much of what we do spend. Many of them, too, are children who have been forced back into the classrooms by the operation of the compulsory attendance laws, but their presence there is not productive of the results which society expects. To care adequately for them calls first for a careful physical and mental examination of each child, to determine needs and capacities, and then for that special attention to particular defects and capacities which will enable these children to make what is for them satisfactory school progress.

It has been especially difficult for our teachers to do much for or with these problem children, in part because the training of both teachers and principals has not included work that would prepare them to recognize either defects or special capacities, or to provide remedial treatment for exceptional children. In consequence the cases, unless marked in characteristics, often have remained unrecognized and an attempt has been made to do in the school-room what cannot be done. The provision of adequate

educational opportunity for many problem children calls for proper diagnosis, special attention to defects and needs, and often for their reclassification, for a restatement of educational objectives, curriculum adjustment, differentiated instruction, a revision of teaching methods, and new types of training in habit formation — all to the end that there may be a removal, in so far as is possible, of the handicaps under which many children suffer, and the training of others for whom the removal of handicaps is not possible, for maximum usefulness in the sphere of life in which they are destined to move.

How to recognize exceptional children in the classroom, the physical and mental characteristics of such cases, how best to train such children with a view to removing or minimizing developmental defects, and the proper care of the gifted and the delinquent — all with a view to the training of each child so that he may develop to the best of his capacities — forms the subject-matter of the present volume. As the author well says, the public is rapidly coming to expect more of the teacher than merely the ability to impart the traditional knowledge of the school. An insight into child needs and child-welfare problems, and an ability to recognize and in part at least to deal with children suffering from developmental disorders or children possessed of special abilities, likewise is rapidly becoming a function of the work of both principals and teachers in our schools. To help teachers to render such a service in the classroom, and the principal in turn to assist his teachers in providing such service, is the purpose the author had in mind in organizing the materials contained in the different chapters of this book. It is believed, by both the author and the editor, that a treatise of large usefulness has been prepared.

ELLWOOD P. CUBBERLEY

PREFACE

THIS book has been constructed to serve as a textbook for college courses in the psychology of exceptional children, as well as a helpful manual and guide for teachers and principals in public and private schools.

The material presented in this volume is based upon hundreds of the most scholarly and scientific researches in the various divisions of specialization that relate to the field covered by the text. Much of the source material is technical and widely scattered in monographs, professional magazines, and detailed scientific treatises, and in consequence largely unavailable to the teacher and student. The writer has tried to gather this material together, to simplify it, and to organize and present it in convenient, practical and usable form, without jeopardy to its authenticity. The best scientific explanations of causes, the best methods for diagnosis and prognosis, and the best methods for remedial treatment are presented for the various types of exceptional children. The case studies given at the ends of the chapters will add to the teaching usefulness of the text, and the selected bibliographies will direct the student to the best available additional literature.

The present movement toward the de-institutionalization of school children brings the classroom teacher in contact with various types of pupils who require different treatment than do normal children. Special classes or rooms are provided by many school systems for various types of exceptional children, where special instruction is given, but usually these children are sent to the regular classes for at least some work so that they may have the contact of normal groups. Thus a classroom teacher may have a deaf, a blind,

or a speech-defective child in her classes a part of each day. That she must understand each handicapped child, and know how to adapt the classroom work to meet his needs, is obvious. Children less noticeably handicapped, such as the neurotic, the left-handed, and the backward, are usually not recognized as exceptional children requiring special attention, and unfortunate developments are often permitted to take place because of this condition. The majority of teachers do not know that they are responsible for many unfortunate developments, nor do they know that, with a little insight and timely attention on their part, these unfortunate outcomes could have been prevented. This book is intended to develop the teacher's insight, and to direct her remedial procedure in the case of exceptional children.

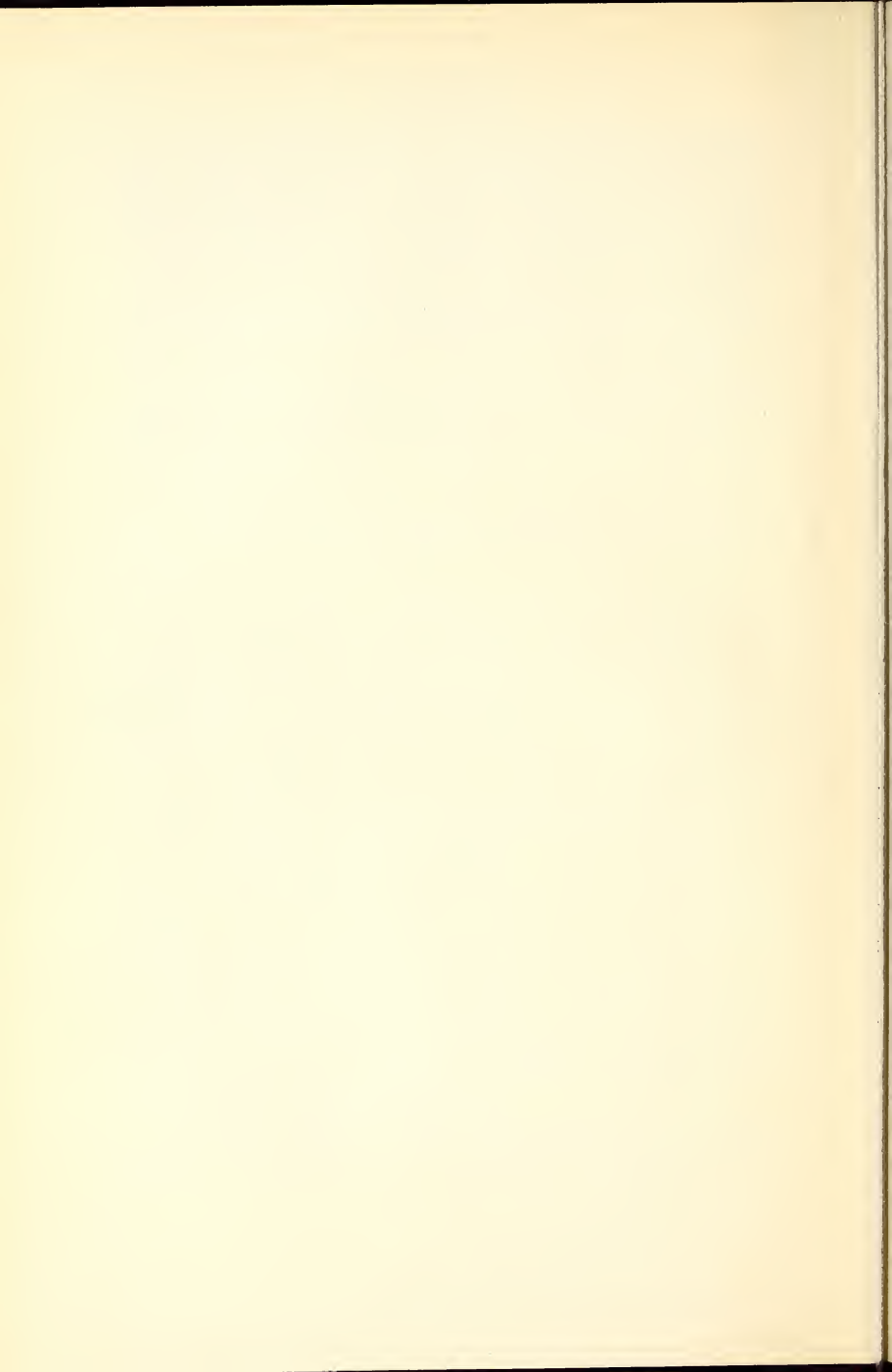
Modern tendencies in education are not to increase the number of supervisors and directors, but to require more adequately trained teachers who are able to coöperate with less guidance. Teaching at present is more than imparting knowledge. It is not seeing how much a child can be made to learn, how many facts he can absorb, how many problems he can be made to work, or how many words he can be taught to spell. It is, rather, helping the individual child to develop to the best of his capacities. To accomplish this aim the teacher must not only have a professional attitude, but she also must be able to recognize and understand individual differences among children, she must be able to look for causes underlying handicaps, to diagnose cases and to adapt or devise methods of procedure that will counteract tendencies toward unfortunate outcomes. It is hoped that this book may play an important rôle in developing such a professional attitude in the teacher.

The writer wishes to take this opportunity to thank Dean E. W. Tiegs, Dean of University College, University

of Southern California, for his help from the beginning to the completion of the manuscript. His constructive criticism, with many specific suggestions based upon a careful reading of the partially completed manuscript, resulted in a great improvement over the originally intended treatment.

Thanks are expressed also to Dr. Ellwood P. Cubberley, Dean of the School of Education, Stanford University, for editorial assistance, to Dr. Forrest N. Anderson, Director of the Los Angeles Child Guidance Clinic, and to Dr. John E. Eames of Los Angeles, for helpful suggestions.

N. V. S.



CONTENTS

I. THE NATURE AND ORIGIN OF TRAIT DIFFERENCES.	1
II. THE CONCEPT OF GENERAL INTELLIGENCE AND ITS MEASUREMENT.	30
1. Measurement by the Binet Scale. 2. Other Types of Tests for Measuring Intelligence. 3. The Physiological Basis of Intelligence.	
III. MAJOR SPEECH DISORDERS	70
1. Stuttering. 2. Lipping.	
IV. MINOR SPEECH DISORDERS	111
1. Baby Talk. 2. Defects of Carelessness. 3. Cluttering. 4. Monotonous Voice. 5. Hoarseness and Harshness. 6. Nasality. 7. Thick Speech. 8. Lalling. 9. Foreign Accent. 10. Speech of Mental Defectives. 11. The Falsetto Voice.	
V. THE LEFT-HANDED CHILD	130
1. Theories as to, and Prevalence of. 2. Relation of Left-handedness to Other Traits. 3. Left-Handedness and Hand-writing. 4. Left-Handedness and "Mirror-Writing." Case Study of a Mirror-Writer. 5. Directions for Testing Eyedness.	
VI. THE MENTALLY SUBNORMAL CHILD.	181
1. Hereditary and Acquired Feeble-Mindedness. 2. Psychological Characteristics of the Feeble-Minded. 3. Physical Condition of the Feeble-Minded. 4. Training of the Feeble-Minded.	
VII. SPECIAL TYPES OF FEEBLE-MINDEDNESS	213
I. Due to Arrested or Perverted Development.	
1. Cretins. 2. Mongols. 3. Microcephalics.	
II. Acquired Forms.	
Hydrocephalics. 5. Paralytics. 6. Meningitics.	
VIII. GIFTED CHILDREN	231
1. Frequency and cause. 2. Mental Development of Superior Children. 3. Physical Development of Superior Children.	

4. Abilities and Interests of Superior Children. 5. Character and Stability of Superior Children. 6. The School Training of Superior Children.	
IX. SPECIAL TYPES OF GIFTED CHILDREN	268
1. Musically Gifted Children. 2. Children Especially Gifted in Art. 3. Poetically Gifted Children.	
X. THE PSYCHONEUROTIC CHILD	291
XI. THE PSYCHOPATHIC CHILD.	315
XII. THE DEAF CHILD	327
XIII. THE BLIND CHILD	358
1. Causes of Blindness. 2. Training of the Blind Child. 3. Training in Reading, and for Vocations. 4. Sense-Acuity of the Blind.	
XIV. THE CONGENITALLY WORD-BLIND CHILD	403
XV. THE DELINQUENT CHILD	430
1. Types of Cases and Offenses. 2. Causes of Delinquency. 3. Physical Condition and Intelligence Levels of Delinquents. 4. The Outcomes of Treatment.	
XVI. OTHER TYPES OF EXCEPTIONAL CHILDREN . . .	475
1. The Epileptic Child. 2. The Hysterical Child. 3. The Backward Child. 4. The Undernourished Child. 5. The Over-weight Child.	
INDEX	505

FIGURES

1. The Normal Frequency Curve	4
2. Variations in Physiological Properties	6
3. Distribution of 1921 Exceptional Children	8
4. Galton's Law of Ancestral Inheritance	21
5. Mendel's Law of Segregation	24
6. Distribution of 905 School Children in Intelligence	36
7. Growth in Mental Age	40
8. Seguin and Goddard Form Board	45
9. Knox-Kempf Feature Profile Test	46
10. A Page from the Army Alpha	48-49
11. Distribution of Alpha Scores of Officers and Men	57
12. The Neurone and its Parts	61
13. Three Synapses or "Synaptic Connections"	62
14. Brains of Vertebrates	63
15. Side View of Left Hemisphere of Brain	65
16. Inner Surface of Right Hemisphere of Brain	65
17. Diagram Showing the Area of Brain Lesion in which 16.7 per cent of the Cortex was Destroyed	67
18. Brain Centers of Speech, Reading, and Writing	87
19. Average Reach of Normal and Tongue-Tied Tongues	105
20. Single and Double Harelip	106
21. Normal and High Palatal Arch	107
22. Normal and Elongated Uvula	118
23. Two Falsetto-Voice Cases	125
24. The Dot-Fixation Test	134
25. Facsimile of the Writing of a "Mirror-Writer"	163

26. Facsimiles of a Precocious Thirteen-Year-Old's Writing .	169
27. Initial Strokes to Remedy "Mirror-Writing" . . .	170
28. Exercises for Remedying "Mirror-Writing" . . .	171
29. Subject's Position in "Mirror-Writing" . . .	172
30. Subject's Position in Normal Writing . . .	172
31. Heredity and Feeble-Mindedness . . .	184
32. Height and Weight of Feeble-Minded Boys . . .	196
33. Height and Weight of Feeble-Minded Girls . . .	197
34. Common Types of Ear Malformations . . .	200
35. "Mongolian" Cranial Contours . . .	216
36. Microcephalic Cranial Contours . . .	222
37. Hydrocephalic Cranial Contours . . .	224
38. A Family-History Chart, Showing Many Eminent People . . .	234
39. Percentile Curves, Showing Comparative Intelligence of Offspring of Two Occupational Groups . . .	236
40. Comparative Distribution of Height for Three Groups .	242
41. Comparative Distribution of Weight-Height Coefficients for Three Groups . . .	243
42. Figures from Voelker-Cady Trustworthiness Test . .	256
43. Mean Total Scores of Gifted and Control Children on Seven Character Tests . . .	258
44. Trait 5; Will Power and Perseverance . . .	259
45. The Relationships of the More Noted Bachs . ¹ facing	272
46. Test for Observation of Light and Shade . . .	274
47. Test for Recognition of Proportion . . . facing	274
48. Tests for Analysis of Problems in Cylindrical Perspec- tive . . .	275
49. Tests in Analysis of Problems in Parallel Perspective .	276
50. Tests in Analysis of Problems in Angular Perspective .	276

FIGURES

xvii

51. Seashore's Audiometer	336
52. The Manual Alphabet	342
53. Pedigree of Hereditary Cataract	361
54. Visual-Acuity Tests	374
55. Twenty-Four-Point Type used in Sight-Saving Classes .	375
56. McCallie's Visual-Acuity Test	376
57. Revised Braille, Grade One and a Half	378-379
58. Auditory Memory and Tactual Sensibility of the Blind .	389
59. School Vision Chart for Children who can Read . . .	397
60. School Vision Chart for those Unacquainted with the Alphabet	398
61. Diagram of Sequence or Conjunction of Some Simple Antecedents and Consequents in the Case of Delin- quents	436
62. Parental Homes of 10,845 Children dealt with by Juvenile Courts in Seven Cities	440
63. Distribution of Boys with Reference to Height . . .	448
64. Distribution of Boys with Reference to Weight . . .	448
65. Distribution of Boys with Reference to Pubertal Develop- ment	449

PLATES

1. A Los Angeles Day School for the Hard of Hearing	Op. Title Page
2. A Cretin, and a Mongol	Op. page 214
3. A Hydrocephalic	Op. page 224
4. A Rhythm Class }	Op. page 332
5. A Speech Class }	
6. Blind Children at Work with Normal Children	Op. page 374



THE PSYCHOLOGY OF EXCEPTIONAL CHILDREN



CHAPTER I

THE NATURE AND ORIGIN OF TRAIT DIFFERENCES

The normal child. The concept of a normal child as one who is perfectly, symmetrically developed in all attributes is an hypothesis. All children possess some traits in plus and some in minus quantities. The subnormal and the supernormal children are not uniformly deficient or uniformly gifted in all traits. Each child is normal in respect to some traits, subnormal in respect to others, and supernormal in respect to still others. Since this is so generally the case, our concept of normality conforms to our concept of average or typical, and we consider the normal child as one having an average amount of shortcomings and an average amount of specialties.

From an educational point of view a child who can reasonably well be taught with a group is considered a normal child.

Exceptional children. Likewise, children who, on account of mental or physical conditions, cannot reasonably well be taught with the group are considered exceptional. These exceptional children deviate from normal or average children to such an extent that special educational facilities must be provided. Among the group of exceptional children are feeble-minded, gifted, psychoneurotic, speech defectives, delinquent, blind, deaf, epileptic, and others, some requiring special method but temporarily.

It is the careful study of these children that forms the problem of this volume. Since the normal child is exceptional in some ways, a better understanding of him will also be obtained by studying the exceptional child, and the seemingly exaggerated solicitude bestowed upon the exceptional child will not seem as ill-proportioned as the following witty poem suggests it to be: ¹

Johnny Jones has lost a leg,
 Fanny's deaf and dumb,
 Marie has epileptic fits,
 Tom's eyes are on the bum.
 Sadie stutters when she talks,
 Mabel has T.B.,
 Morris is a splendid case
 Of imbecility.
 Billy Brown's a truant,
 And Harold is a thief,
 Teddy's parents gave him dope,
 And so he came to grief.
 Gwendolin's a millionaire,
 Jerald is a fool;
 So every one of these darned kids
 Goes to a special school.
 They've specially nice teachers,
 And special things to wear,
 And special time to play in,
 And a special kind of air.
 They've special lunches right in school,
 While I — it makes me wild! —
 I haven't any specialties,
 I'm just a normal child.

Individual differences in children. All children have the same general qualitative make-up. Exceptional children differ from normal children quantitatively; they differ in degree or amount, not in quality of various traits. That is, all children have the same kinds of traits and capacities, but

¹ Published in the *American School Board Journal*.

exceptional children are more or less richly endowed than normal children. They possess more or less memory, attention, will, muscular control, initiative, reasoning, judgment, emotional reaction, and so on. Feeble-minded children, child prodigies, and normal children all possess common basic mental traits, yet in such different amounts that their intellectual achievements show the widest extremes.

Continuous gradation. When any large group of individuals' measurements are arranged serially according to amount of any trait possessed, there are no gaps — no sharp or distinct lines of demarcation at any point. One group shades into another by imperceptible degrees. By agreement we often make crude classifications and distinctions in order to facilitate our work, but nature in distributing every conceivable trait or factor makes one group merge insensibly into the other in an unbroken continuum.

The normal-frequency distribution curve. The frequency curve or polygon is the common manner in which the amount of variation in a given trait is represented. This curve is designed to show how frequently each amount or degree of a given trait occurs in a group of individuals. The range from a small to a large amount is presented along a base-line from left to right, and the number of times each particular amount occurs is represented vertically. Although no factor in nature has yet been measured in sufficiently large numbers so as to show us nature's absolute law of distribution, still many factors have been measured in very many cases, so that it is possible to see the tendency of the natural law of distribution. Plotted frequencies of every trait measured in many cases approximate a smooth, bell-shaped curve. This curve, commonly called the "probability curve," "normal-frequency curve," "normal-frequency polygon," or the "theoretically normal-distribution curve,"

has a number of mathematical properties that can be utilized directly or indirectly in studying individual differences. Most of these properties are too complicated and too technical for our present purposes; it will, however, behoove us to note a few characteristics of this frequency-distribution curve. (Fig. 1.)

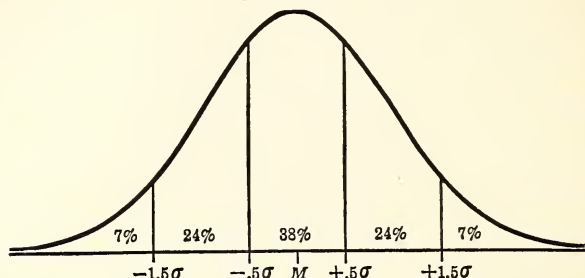


FIG. 1. THE NORMAL FREQUENCY CURVE DIVIDED INTO FIVE PARTS FOR FACILITATING THE GROUPING OF INDIVIDUAL DIFFERENCES
(From Tiegs and Crawford)

If a very small area is taken from each of the extreme ends of the curve (for the extremes are only approached, never actually attained) and perpendiculars are erected at the points dividing the base-line into five approximately equal parts, the areas will contain the following percentages of the whole area:

Area on extreme left	Next area	Middle area	Next area	Area on extreme right
7%	24%	38%	24%	7%

These percentage distributions¹ on the curve are often

¹ "These percentages (approximately) are derived from dividing the base-line of the normal curve into five σ units, 2.5 of which are on either side of the mean, and throwing the few cases that fall further out than 2.5 σ units in with their adjacent subdivision." (Tiegs, E. W., and Crawford, C. C., *Statistics for Teachers*, p. 118. Houghton Mifflin Company, 1930.)

used as aids in distinguishing groups between individual differences in classroom achievements. They can also help us picture more vividly the distribution of various traits and factors of individuals, the gradual transition in regard to individual differences, and our arbitrary classification of individual differences.

Characteristics of the ideal probability curve. The following fundamental factors characterize this curve:

1. The measures cluster around a "mode" — that is, the measure of greatest frequency. The mode indicates the central tendency or typical condition.
2. Small variations from the central tendency are more frequent than large variations. The decrease is at first slow, then rapid, then slow again. Thus a "bell-shaped" curve results.
3. The variations are continuous. There are no gaps between the different segments of the curve.
4. The curve is symmetrical. Theoretically there are as many variations above the central tendency as below.

Factors affecting the curve. This curve, however, is an ideal curve; in practice it is only approximated. The inability to measure any factor in all cases of nature will always leave the normal curve a theoretical entity. The greater the number of measurements of a single trait that are made, the closer is the approximation of the curve. If measurements are made of selected cases, the curve may be "skewed" toward one side or the other, or it may contain two or more modes. Moreover, the normal curve in most human traits probably tends to skew toward the minus side, owing to environmental influences such as illness, accidents, and various social hamperings, which tend to produce physical and mental deterioration. Similar factors do not contribute to proportionate positive variations from the central tendency.

When a limited number of more or less selected cases are

measured with crude scales, a frequency-polygon, as Figure 2, is typical.

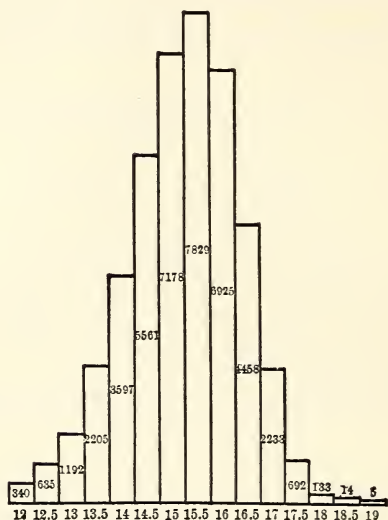


FIG. 2. VARIATIONS IN PHYSIOLOGICAL PROPERTIES

Forty thousand sugar beets, tested individually, showed from 12 to 19 per cent of sugar. Beets containing 15.5 per cent of sugar were the most frequent, but there were almost as many beets with 15 per cent or with 16 per cent. As the percentage of sugar departed more from the typical 15.5 per cent, the number of individuals with a given sugar content diminished, so that the extremely poor and the extremely rich beets were also fewest in number.

Proportion of exceptional children. A Connecticut statute defines educationally exceptional children as those "over four and under sixteen years of age, who, because of mental or physical handicap, are incapable of receiving proper benefit from ordinary instruction, and who for their own and the social welfare need special educational provisions." On the basis of this definition, Gesell¹ estimates that about one

¹ Gesell, Arnold. *The Pre-School Child*, chap. vi. Houghton Mifflin Company, 1923.

public school pupil out of every twenty-five may be regarded as exceptional. The distribution of these exceptional children per 1000 he estimates as follows:

Blind and partially sighted.....	3
Deaf and semi-deaf.....	2
Crippled.....	2
Physically defective.....	12
Psychopathic.....	2
Delinquent.....	4
Speech defective.....	3
Mentally deficient.....	12
Total per 1000.....	<u>40</u>

This does not include the dull nor the gifted. Including these two groups, he estimates that the number of exceptional children would be brought up to 50 per 1000.

In a study of exceptional children in the New Haven public schools, Gesell ¹ asked 500 teachers to report the number of exceptional children in their classes. The census called for only the more extreme and serious deviations. An effort was made to exclude milder and less consequential deviations from normalcy. The exceptional children were grouped into nine classes; semi-deaf, semi-blind, speech defective, epileptic, delinquent, nervous, physically inferior, mentally superior, and seriously backward. Returns showed group frequencies ranging from 18 to 725, and a total of 1921 cases. The accompanying chart (Figure 3) presents the findings graphically.

Even though the findings in the school population studied showed that about one child in every fifteen deviated sufficiently from the normal to demand especial educational consideration, Gesell did not consider the figures exaggerations.

¹ Gesell, Arnold. *Exceptional Children in Public School Policy*. Yale University Press, 1921. (Pamphlet.)

Should we include minor deviations as justified in demanding especial considerations, every child could demand it. This is, indeed, the tendency in the best school systems — to individualize instruction.

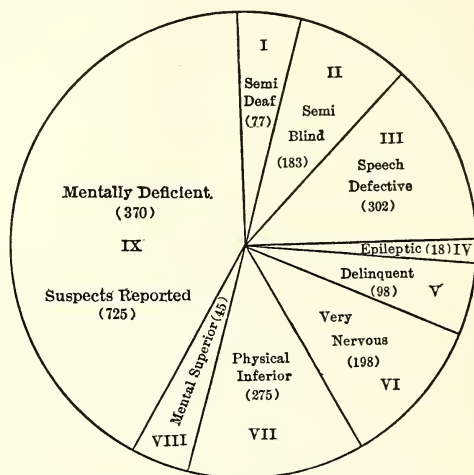


FIG. 3. DISTRIBUTION OF 1921 EXCEPTIONAL CHILDREN
As reported by 500 teachers. (After Goddard.)

Groszman,¹ on the basis of extensive medical reports and special investigations, estimates that only 25 per cent of all children of school age in the United States are perfectly healthy and normal. All others he considers more or less handicapped and in danger. One half of the school children he classifies as pseudo-atypical — those children who are laboring under some removable disadvantage, scholastic, physical, or otherwise. The remaining 25 per cent he considers the truly exceptional children. His classification of all school children in the United States is as follows:

¹ Groszman, M. P. E. *The Exceptional Child*, pp. 8-9. Charles Scribner's Sons, 1917.

	Per cent
Perfectly healthy and normal children.....	25
Pseudo-atypical children.....	50
Including those suffering from easily removable difficulties, including physical ailments.	
Atypical children.....	18
Including exceptionally bright, the nervous, the difficult, and the retarded.	
Subnormal children.....	5
Including the blind, deaf, crippled, arrested, economically submerged, and primitive groups.	
Abnormal children.....	2
Including the moral perverts and imbeciles, the feeble-minded, insane, and the like.	

Of the physical ailments alluded to, he gives the following percentages:

- 50 to 75 per cent suffer from defective teeth (with all the consequences resulting therefrom)
- 30 per cent suffer from nasal obstruction
- 26 per cent suffer from eyestrain
- 20 to 25 per cent suffer from nervous disorders
- 12 per cent suffer from some deformity
- 4 per cent suffer from defective hearing
- 2½ per cent suffer from tuberculosis

Some investigators claim that 90 per cent of our school children have some defect or ailment; the more conservative restrict their estimations to 75 per cent.

Educational provisions for exceptional children in city schools. The first special classes in our public school systems were established for the dull children. Perhaps, because of the impossibility of escaping the many immediate and serious problems presented by these mentally inferior children, many city schools were compelled to recognize these exceptional children and to provide educational facilities suited to their capacities.

10 PSYCHOLOGY OF EXCEPTIONAL CHILDREN

Classes for the gifted children are a more recent and a less widespread institution. The superior children give so little annoyance and cause so few administrative problems that it is not at all surprising to find these children neglected. Opportunity classes or opportunity rooms for the highly endowed children are now only beginning to be recognized as the gifted child's right, and in many cities this special grouping is still received with a feeling of hostility. The idea that "all men are created equal" is thoroughly ingrained in many average minds, and the altruistic spirit of helping the handicapped is not accompanied by a corollary stressing proportionate help for each child.

Special provisions for other types of exceptional children are provided in but comparatively few cities, and there seems to be no agreement as to which group merits the special provisions most. Horn,¹ in investigating the special educational activities carried on in the 68 American cities having a population of more than 100,000, found that 21 made no special provisions for 5 groups in which he was especially interested, namely, incorrigibles, speech defectives, deaf, blind, and crippled, while only 5 cities provided special educational opportunities for all of these types. Between these extremes he found cities making provisions for 1, 2, 3, or 4 of the types, but found practically no agreement as to which group of children presents the most pressing need when not all of them can be provided for. Table I gives his findings for cities with a population of over 200,000. Of the 35 cities with population between 100,000 and 200,000, a total of only 20 special provisions was reported. It is, perhaps, safe to infer that scarcely any cities, smaller than those included in the survey, provide for any of these exceptional groups.

¹ Horn, J. L. *The Education of Exceptional Children*, pp. 25-27. The Century Company, 1924.

TRAIT DIFFERENCES

11

TABLE I. AMERICAN CITIES WITH A POPULATION OF 200,000 OR OVER, AND THE SPECIAL EDUCATIONAL ACTIVITIES CARRIED ON BY EACH

(From Horn.)

Rank in size	Name of city	Incorrigibles	Speech defectives	Deaf	Blind	Crippled
1	New York.....	×	×	×	×	×
2	Chicago.....	×	×	×	×	×
3	Philadelphia.....	×	×	×	—	×
4	Detroit.....	×	×	×	×	×
5	Cleveland.....	×	×	×	×	×
6	St. Louis.....	×	×	×	—	—
7	Boston.....	×	×	×	—	—
8	Baltimore.....	×	—	×	—	×
9	Pittsburg.....	—	×	—	—	×
10	Los Angeles.....	×	×	×	×	—
11	Buffalo.....	×	×	×	×	—
12	San Francisco.....	×	×	×	—	—
13	Milwaukee.....	—	×	×	×	—
14	Washington.....	×	—	—	—	—
15	Newark.....	×	×	×	×	×
16	Cincinnati.....	×	×	—	×	×
17	New Orleans.....	—	×	×	—	—
18	Minneapolis.....	—	×	×	—	×
19	Kansas City, Missouri...	×	—	×	—	—
20	Seattle.....	×	×	×	×	—
21	Indianapolis.....	×	—	—	—	—
22	Jersey City.....	—	—	—	—	—
23	Rochester.....	×	×	—	—	×
24	Portland, Oregon.....	—	—	×	—	—
25	Denver.....	—	×	—	—	—
26	Toledo.....	—	—	×	×	×
27	Providence.....	×	—	—	—	—
28	Columbus.....	×	—	—	—	—
29	Louisville.....	×	—	—	—	—
30	St. Paul.....	—	×	×	×	—
31	Oakland.....	—	—	×	—	—
32	Akron.....	×	—	×	—	×
33	Atlanta.....	×	—	×	—	—

The total population group for which special educational provision is made for these five types of exceptional children is small in comparison with the population not providing for these groups. This comparison is presented in Table II.¹

TABLE II. SCHOOL POPULATION AND PROVISIONS FOR
EXCEPTIONAL CHILDREN

	Incorrigible	Blind	Crippled	Speech defective	Deaf
Provision actually made for a population group of	14,760,733	13,261,812	15,254,475	18,866,823	20,512,852
Rest of population in this study for whom no pro- vision exists	12,668,787	14,167,708	12,175,045	8,562,697	6,916,668
Population of continental United States not in- cluded in this group for whom probably very little opportunity for special education is found (except for the deaf)	78,281,100	78,281,100	78,281,100	78,281,100	78,281,100
Total population of con- tinental United States (1920 Census)	105,710,620	105,710,620	105,710,620	105,710,620	105,710,620

Causes of individual differences. The two general factors responsible for the individual traits of normal children, namely, heredity and environment, are also responsible for the individual traits of exceptional children. Which of these two factors is of greater significance in the development of an individual is a moot question. It is, perhaps, safe to say that the combination and interaction of environmental and hereditary factors are responsible for widest variations in constantly varying proportions.

Heredity; Reproduction. The significance of heredity in the production of exceptional children is best emphasized by reference to the theories of reproduction and heredity.

Every human being has originally sprung from two cells, one coming from each parent. The male cell is known as

¹ Horn, *op. cit.*, p. 31.

the *spermatozoön*, and the female cell as the *ovum*. The fusion of these two cells marks the conception of what is going to be a human being. Even at conception this fused mass is theoretically limited to possible lines of development. Soon after the union of these cells, growth accompanied by rapid division takes place, giving rise to an enormous number of cells, which are gradually evolved into a complete human body.

All the cells that give rise to the reproductive elements in the adult are called the *germ plasm*. All the cells that take part in the development of the body of the embryo are called the *somatic* or *body plasm*. It is generally believed that the germ plasm is continuous (Weismann's doctrine of the continuity of the germ plasm), passing from one generation to another and keeping more or less specialized and distinct from the body plasm. Accordingly, each individual is but a temporary abode for the germ plasm, which passes on to originate new generations. The germ plasm is not a new structure developed by the body cells of an individual. It exists before the body cells and produces them. At each conception fresh germ plasm is added from the other parent, thus introducing a new element. An individual, therefore, contains the germ plasm for prospective offspring from the very first moment of its own existence.

Weismann's doctrine holds that characteristics acquired by the body cells during the life of an individual cannot affect the germ cells, so that they in turn will produce individuals with similar characteristics. According to this doctrine, the most important influences, and practically the only influences acting upon the germ plasm of either good or bad stock, are those introduced by fusion with the germ plasm of the other parent. Bad stocks may be raised by union with good stocks, and good stocks may be tainted by mixture with bad stocks. This mixture of stocks is thus

considered the important factor in producing individual differences, as well as in establishing new stocks.

In his later works, Weismann admitted that certain particular morbid states of the body may so affect the germ plasm as to bring about pathological variations; also that the same result may follow adverse environmental influences acting *directly* upon the germ plasm.

Lamarck's theory of inheritance of acquired characteristics. Weismann's doctrine was proposed in opposition to Lamarck's theory of the inheritance of acquired characteristics. This theory claimed that characteristics acquired during the life of an individual organism may influence the germ cells so that the acquired characteristics are inheritable. Often this theory was interpreted rather literally, especially by its opponents. Later extensive experimentation demonstrated that characteristics acquired by body cells are inheritable, often for several generations. These experimental data gave rise to the Neo-Lamarckian theory which grants that all that is inherited is inherent in the germ cells from which the individual develops, but that environmental factors influencing body cells may influence germ cells also.

Environment. Many extraneous physical factors of environment are responsible for the individual differences of characteristic traits encountered among children. Among the more important environmental factors contributing to subnormality are diseases, infections, poisons, accidents, improper food, poor training, and poor social conditions. Any of these factors can make a subnormal child out of a normal one.

On the other hand, favorable environmental conditions, while not capable of making a superior child out of a potentially normal child, can be responsible for encouraging and permitting the innate capacities of the child to develop.

These innate capacities, given an opportunity to develop, often prove to be superior, whereas under ordinary or inferior conditions they would have manifested but normal or subnormal characteristics. That "genius will out" despite all physical restrictions is more apt to be the exception than the rule. Extreme poverty and extreme ill health, simultaneously encountered, are factors that no individual, child or adult, can cope with, no matter how superior his capacities may be.

Environmental factors may operate at various times during the life of an individual, and may be grossly grouped into post-natal, natal, and pre-natal factors.

The post-natal factors are the extraneous factors and conditions encountered by the child after birth. That these factors are potent in causing differences in children is too obvious a fact to require more than cursory comment. Our whole system of school training is based upon the assurance that training can make children different from what they would be if permitted to remain untrained. Our juvenile courts are established primarily upon the contention that a child's transgressions are largely due to unfavorable environmental conditions. Child-guidance clinics, child-welfare stations, child-labor laws, and numerous organizations interested in children are devoting their energies toward surrounding the child with an environment that will be influential in insuring proper development.

Unfavorable circumstances at birth may prove detrimental to the child's later development. A physical equipment developed during pre-natal life may be propitious to the development of desirable traits and characteristics, yet at birth this equipment may be so modified that these traits cannot develop. Unfortunately, favorable circumstances cannot secure better qualities for the child than by physical basis was provided during pre-natal life.

The child's pre-natal environment may be influential in determining his later development, but as a rule we ignore this fact. That pre-natal factors are significant in affecting the body cells and also the germ cells of offspring has been illustrated in experimentation. Summary reports of some experiments are here given which show the potent influences of pre-natal environment on one or more generations.

Lead poisoning. C. V. Weller fed commercial white lead in gelatine capsules to male guinea pigs and mated them with normal females. There was no impairment of the digestion, since care was taken not to overdose. The average litter for 32 control matings was 1.8, for 34 matings of lead-poisoned males with normal females, 1.9, and for 27 matings of lead-poisoned females with normal males, 1.7. The effect of chronic poisoning on the male germ plasm was the production of sterility in some cases; in other cases, a 20 per cent loss of weight in offspring at birth and permanent underweight, and a higher mortality rate during the first week.

Rennert reports frequent abortions, deaf-mutes, and macrocephalics in offspring of mothers employed in pottery works in Germany.

It has been shown that lead may pass from the mother's blood to the fetus, and from the mother's milk to the child. When both parents have been working in lead, the evils of lead affect the fetus and the continuance of pregnancy 94 times out of 100; when the mother alone has been affected, 92 times; and when the father alone has been affected, 63 times out of 100.

Roques and Thomas Oliver have reported epilepsy, imbecility, and idiocy as effects of parental lead poisoning, the effects being worse when both parents are affected, and worse when the mother is affected as compared with the father.

Effects of moisture changes in the environment. Kammerer experimentally showed that when the pregnant *Salamandra maculosa*, which is oviparous, inhabits lowlands, and produces from 30 to 40 gullied yellow and black offspring, is kept in dry surroundings, the first offspring perish unless placed in water. At the fourth pregnancy, however, the offspring are born as fully developed land salamanders, possessing lungs and limbs. Thus the *Salamandra maculosa* assumes the breathing habits of the *Salamandra atra*, which is black, lives at high altitudes, is viviparous, and produces only two young, which are land animals from the time of birth. These habits, furthermore, are transmitted to the following generations.

Effects of color changes in environment. Kammerer also converted the striped form of *Salamandra maculosa* into the asymmetrically spotted form, and *vice versa*, by keeping the young upon black or yellow backgrounds. These converted forms bred true. When a naturally striped individual was crossed with a spotted individual, all the offspring were spotted, the latter of which when inbred produced a progeny in which, on the average, one out of four was striped. When an artificially striped individual was crossed with a spotted one, all the offspring were intermediate in pattern, having symmetrical rows of spots. The conclusion reached was that a "new" (acquired) characteristic may stimulate, irritate, or influence the germ plasm, while an "old" (inherited) characteristic is incapable of doing so.

In a similar experiment, Kammerer grew eyes in the sightless proteus, whose eyes have atrophied to mere rudimentary spots beneath the skin through ages of living in deep marine caves. He exposed the newts, in their watery home, to red lights continuously for five years from birth. In the course of several generations a group was born with eyes, and the offspring of these also were born with eyes.

Effects of toxins and toxemias. Carrière inoculated male and female guinea pigs with the toxins and soluble products of tubercle bacilli. Of the progeny, 16.6 per cent were stillbirths, 10 per cent died when less than 10 days old, while 73.3 per cent survived. In a similar experiment with chickens, Lustig observed diminished fertility, diminished vitality in the offspring, and the production of more monstrosities.

It has been claimed that the tubercle bacilli cannot enter the germ plasm, but it has not yet been demonstrated that the toxin produced by this disease cannot impair the human germ plasm or embryo. In regard to the effects of syphilis, however, the conviction is generally held that the effects may be transmitted to offspring through one or two generations, and sometimes longer.

David Orr and R. G. Rows claim that toxemias during pregnancy may produce mental defects. G. E. Shuttleworth and W. A. Potts hold that malaria and other infectious diseases, shortly before conception, may affect the mental capacity of the child, and that the toxins may become injurious when the mothers cannot destroy them. These effects, they consider, are worse during early pregnancy and after repeated infection. McGarrison reports that the toxins have worse effects upon the fetus when the mothers are poorly nourished, and that the most severe types of cretinism are found only among the poor. Catola claims that the defective nutrition of the mother may produce imperfect myelination of certain nerve tracts, or produce lesions of the central nervous system.

Effects of parental alcoholism. In regard to the effects of parental inebriety upon offspring, literature is replete with findings and conclusions based upon animal experimentations, investigations, extensive observations, clinical diagnoses, and opinions. Unfortunately, these conclusions

are at variance. Thus, Lapage says that alcoholism is not important, and considers it "simply evidence of neuropathic inheritance." Tredgold considers alcoholism as the sole cause of only 1.5 per cent of feeble-mindedness. Goddard found inebriety six times as frequent in his hereditary group as in his normal group. He, too, considers it not as a cause of feeble-mindedness, but as a symptom indicating the presence of a neuropathic taint, especially feeble-mindedness. However, Marr holds that ancestral drunkenness is especially potent in promoting feeble-mindedness. Some authorities claim it is one of the most frequent causes of epilepsy, general degeneration, deformity, and feeble-mindedness. In regard to the effects of alcoholism at the time of conception, technical literature cites specific diverse findings *ad nauseam*.

Summarily, observations of human parental alcoholism and animal experimentation seem to indicate that alcohol is a subtle and insidious poison, affecting to a greater or less degree the germ plasm and the embryo in such a way that it may weaken or injure the more resistant offspring and exterminate the less resistant.

Theories of inheritance. Recognizing that both heredity and environment are potent factors in the life of an individual, and that their constantly varying interaction is largely responsible for individual differences encountered among human beings, will enable us to comprehend some of the specific theories in regard to the nature of inheritance.

The capacity of a plant or animal to reproduce individuals of a like kind is known as *heredity*. Departures from this rule of like begetting like are known as *variations*. There are two main classes of variations, continuous or slight, and discontinuous or "sudden."

Slight variations are due to a peculiar development resulting from alterations in environmental conditions, and

are called *fluctuations*, or *modifications*. They are non-inherited. These variations may be of a progressive type, forming an advance on the previous generation, or retrogressive, forming a regress backward. When several generations are skipped in the inheritance of a character, heredity is said to be atavistic or reversive. A gifted child born of average parents is a variation of the progressive type, and a feeble-minded child born of average or of gifted parents is an illustration of a retrogressive type of inheritance.

New species arising suddenly from the parent species are known as *mutations* and give rise to sports, which are individuals with definite new characteristics. A mutation may be progressive or retrogressive. The greatest significance in regard to these mutations is that they breed true if mated together, and will form and perpetuate a new species.

In all cases offspring differ more or less from their parents and from one another. No two children of the same family are ever exactly alike. Even identical twins that have come from the same germ cells do not remain identical long. The elements of the chemistry of living things are constant, yet the individuals of both plants and animals, comprised of these elements, are unique.

The law of ancestral inheritance. Galton, the founder of the scientific study of inheritance, made extensive studies of families with regard to genius, stature, eye-color, disease, and other traits. As a result of his researches he proposed the *law of ancestral inheritance*, which he stated as follows:

The two parents contribute between them on the average one half of each inherited faculty, each of them contributing one quarter of it. The four grandparents contribute between them one quarter, or each of them one sixteenth; and so on, the sum of the series $\frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16} \dots$ being equal

to 1, as it should be. It is a property of this infinite series that each term is equal to the sum of all those that follow: thus, $\frac{1}{2} = \frac{1}{4} + \frac{1}{8} + \frac{1}{16} + \dots$, $\frac{1}{4} = \frac{1}{8} + \frac{1}{16} + \dots$, and so on. The prepotencies of particular ancestors in any given pedigree are eliminated by a law which deals only with average contributions, and the various prepotencies of sex with respect to different qualities are also presumably eliminated.

The accompanying figure (Fig. 4) represents Galton's law of ancestral inheritance graphically.

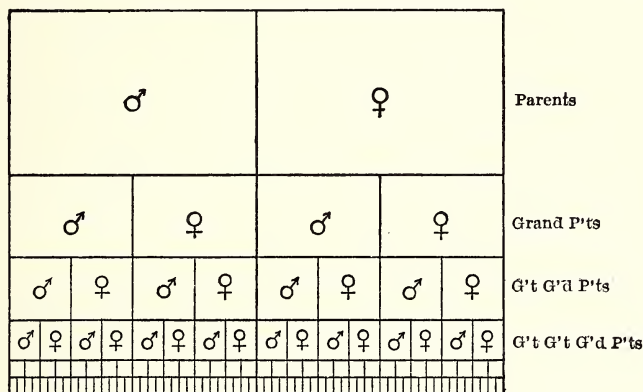


FIG. 4. GALTON'S LAW OF ANCESTRAL INHERITANCE

The whole heritage is represented by the entire rectangle; that derived from each progenitor by the smaller squares; the number of the latter doubles in each ascending generation while its area is halved. (After Thompson.)

The law of filial regression. Galton also formulated a second principle which he called the *law of filial regression*, or the tendency to average. He noted that nature apparently tended to maintain the type or average. Extremes of parents are less extreme in children. In regard to height, parents, both of whom are unusually tall, as a rule have children who are taller than the general average, but shorter than the parents themselves.

Both of Galton's laws have been modified by modern investigators. Conklin¹ says that we now know that we do not inherit equally from all our ancestors; on the average we inherit about as many traits from our fathers as from our mothers,

but inheritance from the four grandparents is usually unequal, and the farther back we go, the more ancestors we find who have contributed nothing to our inheritance. Of all the thousands or even millions of ancestors that each of us has had, only a relatively small number have contributed anything to our inheritance; although we are descended from all the others, we are not related to them biologically and have received none of their traits. Those who have contributed to our inheritance may be called "contributing ancestors" or merely "contributors," to distinguish them from non-contributing ones, and the fact that ancestors do not contribute equally to heredity disproves Galton's "law of ancestral inheritance."

The second principle also cannot be taken as Galton originally interpreted it, for he did not always distinguish between hereditary and environmental characters.

Mendelian theories of inheritance. An Austrian monk, Gregor Mendel (1822-84), first discovered and formulated some principles of heredity. Mendel was puzzled over the great variations among his garden peas; he noticed that some plants were tall and some were short, some had colored flowers and some white, some had yellow seeds and others green seeds. Altogether he studied seven different pairs of contrasting characters in regard to which the plants differed, and he observed that each plant might have any combination of the single members of these pairs. Thus, a tall plant might have yellow or green seeds, white or colored flowers, smooth or wrinkled seeds, full or shrunken pods.

In attempting to discover nature's plan of inheritance, Mendel conducted an experiment in crossing garden peas

¹ Conklin, E. G. *Heredity and Environment*, p. 80. Princeton University Press, 1922.

that were different. He fixed his attention upon a single character at a time. Thus, he crossed green-seeded plants with yellow-seeded, tall ones with short ones, hairy ones with smooth ones, and so on. On the basis of his extensive research, Mendel presented the following theory in regard to heredity: The total inheritance of an individual is comprised of unit characters, each of which is inherited more or less independently of all the rest. The inheritance of a character is dependent upon the presence of a unit substance in the germ plasm called a *determiner*. When the presence of a unit character's determiner in the germ plasm is plainly manifest, and is transmitted entire or almost unchanged in hybridization, the unit character is said to be *dominant*; when, owing to the lack of its determiner in the germ plasm, a unit character is not manifest and becomes latent in the process of hybridization, the unit character is said to be *recessive*. The ratio of dominants to recessives, when hybrids are self-fertilized, is approximately 3 to 1 in the second filial generation.

Some of Mendel's findings in crossing garden peas are given in Table III. Instead of the offspring having char-

TABLE III. SOME OF MENDEL'S FINDINGS IN CROSSED GARDEN PEAS

Character	Number of dominants	Number of recessives	Ratio
Form of seed.....	5,474 smooth	1,850 hairy	2.96:1
Color of seed coat.....	6,022 yellow	2,001 green	3.01:1
Color of flowers.....	705 colored	224 white	3.15:1
Form of pods.....	882 inflated	299 constricted	2.95:1
Color of unripe pod.....	428 green	152 yellow	2.82:1
Position of flowers.....	651 axial	207 terminal	3.14:1
Length of vine.....	787 tall	211 dwarf	2.84:1

Note that the greater the numbers involved in any experiment, the closer the approximation to a ratio of 3 to 1.

acters somewhere between the characters of the parent plants, complete resemblance of the offspring to one of the

parents (in regard to a particular character) was quite the rule with each of the other pairs of characters. The offspring of a smooth-and-wrinkled seeded cross were all smooth, the offspring of a tall-and-short cross were all tall, and so on. This condition is called *dominance*, since, when two characters of a pair meet in an individual, one of them masks or dominates over the other, called the *recessive*. The recessive is not destroyed or lost; it may reappear in later generations. Which of two characters will appear in a particular offspring, and which will be carried as a recessive, cannot be ascertained before crossing.

For many characters, complete dominance of one alternative over the other is not found in offspring. Segregation is manifested.

Mendel's law of segregation. Mendel also carried out experiments with hybrid peas, crossing hybrids with dominants, hybrids with recessives, and hybrids with hybrids. His experimental findings led him to formulate the law of segregation, as illustrated in the accompanying diagram.

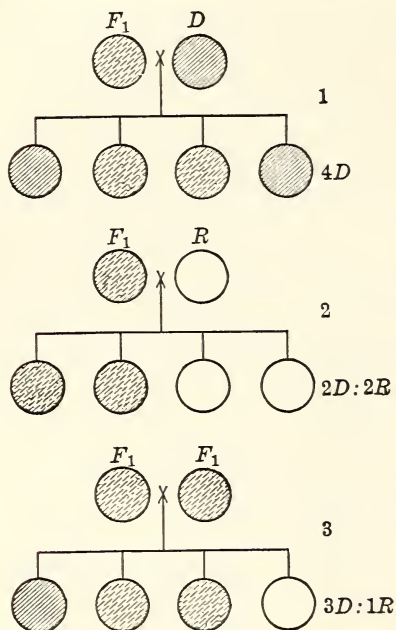


FIG. 5. MENDEL'S LAW OF SEGREGATION

When two individuals with a pair of alternative characters are crossed, the offspring will all have the character of one of the parents; this

character is the dominant one, and the alternative character is the recessive. In the diagram, F_1 represents the hybrid with the dominant character. If such a hybrid is crossed with a pure dominant, D , the next generation will all *appear* dominant (case 1). If a hybrid is crossed with an individual of the recessive type, the offspring will consist of dominants and recessives in about equal numbers, as in case 2. If two hybrids are crossed (case 3), the offspring will show both dominants and recessives, in the proportion of 3 to 1.

Using the case of eye-color, Mendelian characters can be illustrated as follows:

Brown eye-coloring is a dominant condition while blue eye-coloring is a recessive condition,¹ for it seems that the inheritance of brown eyes is due to the presence in the germ-plasm of a determiner upon which the formation of brown pigment in the irides depends. Blue eyes are thought to be due to a lack of a determiner for brown eye pigment in the germ plasm, because the blue eye-coloring is due merely to the effect of blue produced by the choroid coat shining through the opalescent but unpigmented layers of the irides.

In regard to the condition of any character, every one inherits from two sources, namely, from each parent. In respect to any character he may, therefore, be pure-bred or hybrid. When a character is inherited from both parents, it is called *duplex inheritance* (designated by the symbol DD). When a character is inherited from only one parent, it is called *simplex inheritance* (designated by the symbol DR). When a character is not inherited from either parent, thereby exhibiting the recessive condition, it is called *nulliplex inheritance* (designated by the symbol RR).

Possible combinations of mates. On the basis of his extensive research, Mendel formulated estimates in regard

¹ Davenport, C. B. *Science*, N.S., vol. 26, pp. 589-92. (November, 1907.)

to the relative number of each type of offspring in various combinations of mates. Theoretically there are but six possible combinations of mates. In the case of the Mendelian character of eye-color, these possible matings, with the inheritance of the characters in the offspring, are as follows:

1. Both parents brown-eyed and duplex.

All children will be brown-eyed and duplex.

$$DD \times DD = DD$$

2. Both parents brown-eyed, one duplex and one simplex.

All children will be brown-eyed, half duplex and half simplex.

$$DD \times DR = DD + DR$$

3. Both parents brown-eyed and simplex.

One fourth of the children will be brown-eyed and duplex, one half will be brown-eyed and simplex, and one fourth will be blue-eyed (nulliplex).

$$DR \times DR = DD + 2 DR + RR$$

4. One parent brown-eyed and duplex, the other blue-eyed.

All children will be brown-eyed and simplex.

$$DD \times RR = DR$$

5. One parent brown-eyed and simplex, the other parent blue-eyed.

Half the children will be brown-eyed and simplex and the other half blue-eyed.

$$DR \times RR = DR + RR$$

6. Both parents blue-eyed (nulliplex).

All children will be blue-eyed.

$$RR \times RR = RR$$

From these formulæ it can be seen that no prediction in regard to the proportions of various types of offspring can be made until it is known whether a character is dominant or recessive in each parent, and in the case of a dominant character, it is also necessary to know whether it is duplex or simplex. In most cases this knowledge can be obtained only by a study of the ancestry and the offspring of an individual. As, for example, in the case of blue eyes, we

know the color is nulliplex, for there is no brown pigment present, and hence the determiner for brown pigment could not have been inherited from either parent. In the case of brown eyes, whether the brown-eye determiner was inherited from one parent or from both cannot be known except by a study of the ancestry and offspring.

Summarily, the essential difference between a dominant and a recessive condition of a character is that in simplex inheritance the dominant condition is plainly manifest, while the recessive condition is not apparent and can be known to exist only through a study of ancestry and offspring.

The question as to just what factors or traits can be inherited often arises. In all probability, any physiological structure can be inherited according to the laws of inheritance. Thus, stature, skin-color, and facial features are heritable, as well as physiological structures underlying personality traits, intelligence, and the predisposition to physical or mental diseases.

Expectancy of mental disorders. Rosanoff,¹ assuming that most of the inheritable mental disorders are, like other Mendelian characters, transmitted in the manner of Mendelian recessives, gives us the following theoretical expectations:

1. Both parents being neuropathic, all children will be neuropathic.
2. One parent being normal, but with the neuropathic taint from one grandparent, and the other parent being neuropathic, half the children will be neuropathic and half will be normal, but capable of transmitting the neuropathic make-up to their progeny.
3. One parent being normal and of pure normal ancestry, and the other parent being neuropathic, all the children will be

¹ Reprinted by permission from *Manual of Psychiatry*, by A. J. Rosanoff, published by John Wiley & Sons, Inc.

normal, but capable of transmitting the neuropathic make-up to their progeny.

4. Both parents being normal, but each with the neuropathic taint from one grandparent, one fourth of the children will be normal and not capable of transmitting the neuropathic make-up to their progeny, one half will be normal, but capable of transmitting the neuropathic make-up, and the remaining one fourth will be neuropathic.
5. Both parents being normal, one of pure normal ancestry and the other with the neuropathic taint from one grandparent, all the children will be normal; half of them will be capable and half not capable of transmitting the neuropathic make-up to their progeny.
6. Both parents being normal and of pure normal ancestry, all the children will be normal and not capable of transmitting the neuropathic make-up to their progeny.

A very close correspondence between theoretical expectation and actual findings was found in over 1000 cases studied.¹

In the case of exceptional children, many of the traits responsible for the exceptional condition are comprised of inherited characters which may be inherited as dominants or as recessives, subject to the possible theoretical crossings.

SELECTED REFERENCES

1. "Adapting the Schools to Individual Differences"; in *Twenty-Fourth Yearbook of the National Society for the Study of Education*, part 2. Public School Publishing Company, Bloomington, Illinois, 1925.
2. Conklin, E. G. *Heredity and Environment*, Princeton University Press, 1915.
3. Davenport, C. B. "Influences of Heredity on Human Society"; in *Race Improvement in the United States*. Philadelphia, 1909.

¹ Rosanoff, A. J., and Orr, F. I. "A Study of Heredity in Insanity in the Light of the Mendelian Theory"; in *American Journal of Insanity*, vol. 68, no. 2. (1911.)

4. Gesell, A. *Exceptional Children in Public School Policy*. Yale University Press, 1921. (Pamphlet.)
5. Groszman, M. P. E. *The Exceptional Child*. Charles Scribner's Sons, 1917.
6. Holmes, S. J. *Studies in Evolution and Eugenics*. Harcourt, Brace and Company, 1923.
7. Horn, J. L. *The Education of Exceptional Children*. Century Company, 1924.
8. Kellogg, Vernon. *Mind and Heredity*. Princeton University Press, 1923.
9. Morgan, T. H. *The Physical Basis of Heredity*. J. B. Lippincott Company, 1924.
10. Spearman, C. *The Nature of Intelligence and the Principles of Cognition*. The Macmillan Company, 1923.
11. Thorndike, E. L. "The Original Nature of Man"; in *Educational Psychology*, vol. 1. Columbia University Press, Teachers College, 1913.
12. Thorndike, E. L. "Individual Differences"; in *Educational Psychology*, vol. 3. Columbia University Press, Teachers College, 1914.

CHAPTER II

THE CONCEPT OF GENERAL INTELLIGENCE AND ITS MEASUREMENT

Nature of general intelligence. General intelligence is the ability to think and act in a logical way. It cannot be observed as a concrete entity; it is recognized by its products in thoughts and actions; its ultimate delineation is enshrouded in mystery. For practical purposes it is measured by analyzing thoughts and actions.

Various traits or abilities are emphasized as being distinctly characteristic of general intelligence; among these are the ability to adapt oneself to new situations, to solve new problems, and to form abstractions. Commonly, the ability to remember, to reason, to perceive accurately and quickly, to profit by experience, and to form associations are considered indispensable factors of general intelligence. Spearman¹ embodies many of these factors in a cognitive conception of intelligence. Intelligence, he holds, must be based upon the psychology of cognition and all cognition springs originally from experience — that which is immediately “*lived*, undergone, enjoyed,” or apprehended, and that which is *educated* from apprehended characters.

In early times general intelligence was considered a single unitary power that might manifest itself in a definite manner in a single situation or in the performance of a single type of task. With this view of general intelligence, early workers approached its measurement by constructing single tests, usually subject-matter tests. Alfred Binet, an eminent French psychologist, conceived the idea that intelli-

¹ Spearman, C. *The Nature of Intelligence and the Principles of Cognition*. The Macmillan Company, 1923.

gence is not a single quality or power, but a complex of abilities. In this belief he proceeded to search for many types of problems and performances in which intelligence could manifest itself. His work resulted in the development of a radically different type of test, for he also considered intelligence to be inherent or largely native.

1. *Measurement of intelligence by the Binet scale*

Work of Binet-Simon. In order to test native ability, it was necessary for him to avoid testing material commonly taught in the schoolroom, for this would result in a test for subject-matter or school progress rather than innate ability. For the basis of his tests, Binet utilized bits of information available to children in all walks of life — puzzles, problems, questions, and mental tasks that were not likely to be included in the formal training of the child, yet that every child would have ample opportunity to encounter.

Binet worked at the development of a test for general intelligence during a period of fifteen years, part of the time assisted by Simon, a French physician, and in 1908 the *Binet-Simon Scale of Intelligence* was published. This scale was comprised of fifty-four individual test items, which were arranged in order of difficulty; the easiest was designed so that it could be passed by an average three-year-old child, and the most difficult test required the ability of an average adult.

Many revisions of the Binet scale were made within a short time in many countries. In the United States several revisions appeared. In each of these, some of the test items were shifted up or down the scale. In some cases the scale was extended downward to measure the mental ability of small children, and in some it was extended upward to measure the mentality of the superior adult. The scoring and grading of the test in terms of months was also devel-

oped, so that the final score was in terms of years. Two revisions, the Yerkes-Bridges-Hardwick revision and the Herring revision, were developed on the point scale; that is, test items were accredited with point values and the final score was in terms of points. Revisions utilizing the age scale include the Goddard, the Kuhlmann, and the Stanford.

The Stanford-Binet. The *Stanford Revision and Extension of the Binet-Simon Scale of Intelligence*, developed under Terman's direction in 1916, proves to be the most widely used of all revisions; it is most thorough and in many ways is an improvement over the original scale. The revision was extended to ninety test items, arranged in order of difficulty. A series of items is provided for each year level.

In order to give a more comprehensive idea of the nature of this scale, a summary of it is here given.

SUMMARY OF STANFORD-BINET SCALE

Year III

1. Point to 3 parts of body
2. Name 3 familiar objects
3. Enumerate 3 objects in picture
4. Give own sex
5. Give last name
6. Repeat 6 to 7 syllables

Year IV

1. Compare lengths of 2 lines
2. Discriminate 7 geometric forms
3. Count 4 pennies
4. Copy square
5. Comprehend 2 questions
6. Repeat 4 digits

Year V

1. Compare 2 pairs of weights
2. Recognize 4 colors
3. Make 3 æsthetic comparisons

4. Define 4 words (use or better)
5. Show patience in putting divided rectangle together
6. Fulfill 3 commissions

Year VI

1. Discriminate between right and left
2. Recognize omissions of mutilated pictures
3. Count 13 pennies
4. Comprehend 2 questions (second degree)
5. Recognize three coins
6. Repeat 16 to 18 syllables

Year VII

1. Know number of fingers on each hand
2. Describe (or interpret) several pictures
3. Repeat 5 digits
4. Tie bow knot
5. Give differences between 2 pairs of objects
6. Copy diamond

Year VIII

1. Solve (by inferior plan or better) ball and field problem
2. Count backwards from 20
3. Comprehend 2 questions (third degree)
4. Give similarities between two pairs of objects
5. Define 2 words (superior to use)
6. Pass 20 words of vocabulary test

Year IX

1. Know present day in terms of week, month, and year
2. Discriminate 5 weights of a graduating series
3. Repeat 4 digits backwards
4. Make change without coins, paper, or pencil
5. Make sentence out of group of 3 words (2 out of 3 trials)

Year X

1. Pass 30 words of vocabulary test
2. Recognize absurdities of 4 statements
3. Draw designs from memory; 1 correct, 1 half-correct
4. Read short paragraph and report 8 of its items from memory
5. Comprehend 2 questions (fourth degree)
6. Enumerate 60 words in 3 minutes

Year XII

1. Pass 40 words of vocabulary test
2. Define 3 abstract words
3. Solve ball and field problem by superior plan
4. Properly arrange dissected sentences
5. Give interpretation of fables
6. Repeat 5 digits backwards
7. Interpret 3 pictures
8. Give similarities of 3 things

Year XIV

1. Pass 50 words of vocabulary test
2. Formulate rule of number of holes by single cuts in folded paper
3. Give 2 differences between president and king
4. Interpret 2 factual problems
5. Solve 2 arithmetical reasoning problems
6. Visualize hands of the clock at 2 specified times

Year XVI (average adult)

1. Pass 65 words of vocabulary test
2. Interpret fables
3. Give difference between abstract words (3 out of 4)
4. Visualize number of boxes enclosed in larger box (3 out of 4)
5. Repeat 6 digits backwards
6. Learn and use a code

Year XVIII (superior adult)

1. Pass 75 words of vocabulary test
2. Pass a paper-cutting test
3. Repeat 8 digits
4. Repeat thought of passage heard
5. Repeat 7 digits backwards
6. Solve 2 ingenuity tests

A diagnosis of the ninety test items shows that some are designed to measure the ability to manipulate mentally familiar facts, such as repeating digits forward and backward, counting backward, and visualizing changes of the hands of a clock. Some are tests of reasoning, such as

solving problems which utilize the facts of arithmetic, of physical relations, and of practical situations. Some are tests of knowledge of abstract facts and relations, such as defining words like *pity*, *charity*, *revenge*, etc., in giving similarities in three things, as wool, cotton, and leather, and in giving the differences between terms, such as *poverty* and *misery*, and in grasping the content of a short paragraph or a fable.

In general, the separate tests are selected so as to include a variety of tasks requiring various abilities that compose intelligence, namely, learning, acquisition of ideas, abstract ideas, memory, reasoning, attention, concept formation, motor control, visual, auditory, and kinæsthetic imagery, eye-hand coördination, perception, language ability, and so on. Any one or a few test items are not an adequate test for general intelligence. A large variety of items covering various mental abilities must be provided before an adequate sampling of a child's mind can be obtained.

Mental age and I.Q. The highest year-level attained by a child on the Stanford Revision designates his mental age (M.A.); that is, if he attains a ten-year level his M.A. is 10, regardless of his chronological age (C.A.). The ratio of his mental age to his chronological age is expressed in terms of the intelligence quotient (I.Q.), and is obtained by dividing mental age by chronological age:

$$\frac{\text{M.A.}}{\text{C.A.}} = \text{I.Q.}$$

In order to avoid decimal fractions, the intelligence quotient is arbitrarily multiplied by 100.

Children testing exactly at age will have I.Q.'s of 100; those whose chronological ages are less than their mental ages will test over 100, and those whose chronological ages are higher than their mental ages will test below 100. Thus,

a six-year-old child attaining the sixth-year level has an I.Q. of 100:

$$\frac{6}{6} = 1.00 \text{ or I.Q. } 100$$

A six-year-old child attaining but a third-year level has an I.Q. of 50:

$$\frac{3}{6} = .50 \text{ or I.Q. } 50$$

A six-year-old child attaining a twelfth-year level has an I.Q. of 200:

$$\frac{12}{6} = 2.00 \text{ or I.Q. } 200$$

The tests were so constructed that the distribution of test scores, when large numbers of unselected children are tested, will approximate the theoretically normal curve of distribution. Terman, in testing 905 school children, found a range

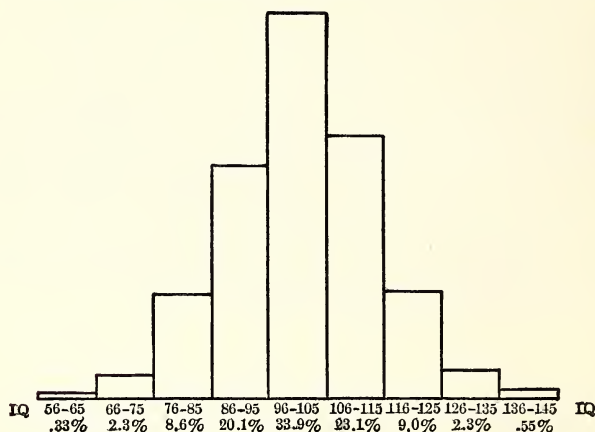


FIG. 6. DISTRIBUTION OF INTELLIGENCE AMONG SCHOOL CHILDREN

Actual distribution of I.Q.'s of 905 unselected school children, 5 to 14 years of age.

(After Terman.)

in scores from 56 I.Q. to 145 I.Q., with the distribution of I.Q.'s as shown in the accompanying figure.

Criteria of an intelligence test. The two most important criteria of a test are *validity* and *reliability*. In order to be valid, an intelligence test must actually test intelligence. The validity of intelligence tests is based upon agreement with other valued judgments of the individual's intelligence. We are constantly being appraised in regard to our intelligence. Ratings received in these general ways must correlate with ratings of intelligence tests. Since many people judge us inaccurately, carelessly, with bias, or are not competent to judge us at all, it is difficult to obtain valuable judgments. Valuable judgments can best be obtained by pooling ratings of a group of competent judges. Such judgments were used in constructing intelligence tests. Since the tests are so constructed that their ratings correlate with the judgments of competent judges, it is now possible to use the intelligence tests directly in ascertaining an individual's intelligence rather than using the more tedious and circuitous route of finding competent judges and pooling judgments. A test's reliability is the extent to which it rates an individual in the same way when, under the same conditions, it is used at different times. A reliable test will yield the same results when given under the same conditions and scored in the same way.

Standardization. A test is said to be standardized when it is valid and is provided with directions for standard methods of administration, standard methods of scoring, standard norms of performance, and standard methods of interpretation. The Binet scale, and its various revisions, include specific directions which must be followed rigidly by the examiner. These directions cover conditions of method of procedure, of language used in presentation, and time of presentation. Standard norms, a most important factor of standardization, are based upon very many cases. Complete instructions for interpreting the results are provided,

and these are constantly growing more detailed as various research workers conduct investigations along various lines.

Although the distribution of intelligence quotients forms a continuous series, it is often desirable to establish divisions, thus forming crude classifications for certain practical purposes. Terman¹ suggested the following classification of children on the basis of I.Q.'s:

Classification	I.Q.	Per cent of all children included
Genius or near genius	Above 140 . . . . .	.25
Very superior	120-140	6.75
Superior	110-120	13.00
Average	90-110	60.00
Dull normal (backward)	80- 90	13.00
Dull (borderline)	70- 80	6.00
Feeble-minded	Below 70	1.0

The feeble-minded are often classed in terms of mental age, as follows:

Classification	Mental age	Per cent of all children included
Morons	8 to 12 years (I.Q. 50 to 70) . . . . .	.75
Imbeciles	3 to 7 years (I.Q. 20 or 25 to 50) . . . . .	.19
Idiots	2 or below (I.Q. below 20 or 25) . . . . .	.06

The growth of intelligence. The I.Q. of the normal child is quite constant from year to year, because it is based upon tests that were constructed so that this would be the case. The rate of growth of intelligence, however, is not uniform from year to year. Intelligence increases from birth to maturity, and then remains more or less constant. During old age it weakens, in many cases. For the normal individual intellectual growth is most rapid from birth to five years; from five to ten years it is not so great; and at some

¹ Terman, L. M. *The Measurement of Intelligence*, p. 79. Houghton Mifflin Company, 1916.

point between thirteen and twenty intellectual capacity approaches its maximum development. Psychologists differ as to whether a fourteen-year level or a sixteen-year level on the Binet scale is the level of the average adult mind. It is quite customary, on the basis of extensive findings, to assume the sixteen-year level on the Stanford revision as the average adult level. This does not deny that intellectual growth continues, in the case of superior individuals, for many years beyond this level, but the many factors influenced by training, environment, interests, and so forth, hamper the construction of tests that will adequately measure such growth. The prolonged acquisition of facts and skills is not an indication of prolonged intellectual growth. Intellectual maturity is measured, not by the amount of intellectual attainments, but rather by the degree of complexity and subtlety of intellectual attainments.

Hollingsworth¹ has likened intellectual capacity to the condition of looms, which "when completed are of various degrees of capacity for weaving complex and subtle patterns. A loom of simple capacity can go on as long as it lasts, weaving new patterns, a given degree of complexity not being exceeded. The neurones can go on as long as a person lives, learning new patterns, but these patterns may not exceed the capacity of that person."

The rate of mental growth and the level of intellectual maturity vary according to the native intelligence of the individual. Thus, an idiot has a much slower rate of mental growth and attains his level of mental maturity at an earlier age than does the normal child. The superior child develops mentally at a more rapid rate and for a longer period of time than a normal child. A comparison of mental age

¹ Hollingsworth, L. S. *Gifted Children: Their Nature and Nurture*, p. 154. The Macmillan Company, 1926.

growth curves of large numbers of unselected children would, perhaps, show fanlike divergences, as is illustrated in Figure 7. It is also quite probable that individual differences in mental growth would cross these curves in many unique ways.

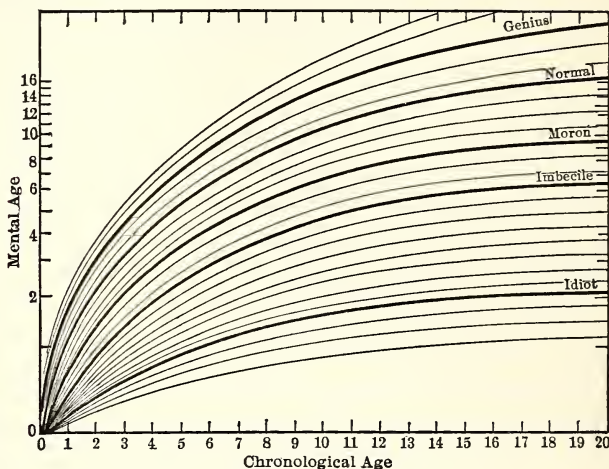


FIG. 7. GROWTH IN MENTAL AGE (*Logarithmic scale*)

Constancy of the I.Q. The constancy of the I.Q. has long been a controversial subject. For practical purposes, the I.Q. is assumed to be approximately constant for average children with average training, opportunity, and environment, within the age limits of six (some say three) to twelve. Gifted and subnormal children, and children who are changed from a very unfavorable to a very favorable environment, or from a very favorable to a very unfavorable environment, cannot show as high a degree of constancy of I.Q. Kuhlmann¹ has pointed out that absolute constancy is

¹ Kuhlmann, F. "The Results of Repeated Mental Reexaminations of 639 Feeble-Minded Over a Period of Ten Years," in *Journal of Applied Psychology*, vol. 5, pp. 195-224. (September, 1921.)

not necessary for purposes of prediction. If the I.Q. is approximately constant for a certain period for normal children, and if we bear in mind that it varies in known ways for other children and for other life periods, we still have sufficient data for purposes of prediction. Accumulating findings point to a rather constant behavior of the I.Q. for average children. Baldwin and Stecher's¹ statements, based upon research, are generally accepted on the matter of I.Q. constancy. "An analysis of the individual growth curve," they say, "shows that the I.Q. is only approximately constant during successive examinations. The amount of difference between I.Q.'s obtained at various examinations is sufficiently small, and the correlations between the examinations are sufficiently high, with small probable errors of estimate, to permit of predicting from an earlier examination what the individual's later development will be."

Criticism of the Binet scale. In trying to avoid tests of scholastic attainment, it was necessary for Binet to include test items that to the layman do not seem indicative of intelligence. This has given rise to criticism. Rumored low ratings on the scale attained by eminent and successful men also often led to a depreciation of the scale. It must be emphasized that the scale is not fool-proof. Its apparent simplicity and the concrete directions for giving and scoring the test have resulted in its abuse in unskilled hands. In unskilled hands the greatest injustices can be incurred, for even though standard conditions in giving and scoring the test can readily be maintained, it is finesse in diagnosing test results that determines skill. Then, too, the unskilled examiner is often overzealous for the perfection of the Binet scale, and considers any criticism against it akin to sacrilege.

¹ Baldwin, Bird T., and Stecher, L. I. *Mental Growth Curve of Normal and Superior Children*; University of Iowa Studies, vol. 2, no. 1, p. 53. University of Iowa, 1922.

The Binet scale is not a sacred instrument nor is it without flaws. Some just criticisms that have been made may be enumerated, as follows: ¹

1. The child's ability to use words fluently is reflected predominantly; his ability to do acts receives but small credit.
2. Some tests depend upon the child's recent environmental experiences, which differ radically among different children.
3. Some tests depend upon the child's schooling, as ability to read and handle pen and pencil.
4. Too great weight is given to "puzzle tests."
5. Unreasonable emphasis is given to tests of ability to define abstract terms.

Burt ² estimates that the results from the Binet-Simon tests are determined to about 54 per cent by school attainments. Thorndike ³ summarizes three fundamental defects as: (1) ambiguity in the content of the tests, (2) arbitrariness in the units of measurement, and (3) ambiguity in the significance.

The objections to the tests are not directed toward the accuracy with which they measure the capabilities of children of each age; they question, rather, whether they measure *native* ability. The great emphasis which the Binet scale places upon linguistic ability and the apprehension of language made it an inadequate test for various groups of children — mainly the illiterate, the foreign, the deaf, those of serious speech disability, and the mentally defective. Tests designed to measure the mentality of these groups were soon supplied in the form of non-verbal or performance tests.

¹ Ayers, L. A. "The Binet-Simon Measuring Scale for Intelligence: Some Criticism and Suggestions"; in *The Psychological Clinic*, November 15, 1911.

² Burt, C. *Mental and Scholastic Tests*, pp. 182 ff. P. S. King and Sons, London.

³ Thorndike, E. L. *Psychological Review*, May, 1924.

Hollingsworth¹ points out existing imperfections of the Stanford-Binet scale and similar scales used in classifying gifted children, in that they cease to yield a maximum measure of the gifted long before these children reach maturity. Children above 150 I.Q. begin to exceed the upper limits of this scale by the time they are eleven years of age, and their intelligence is thereafter no longer fully measured because enough tests of sufficiently diversified difficulty at the higher levels are not provided. In summary, she states that the Stanford-Binet, and other scales like it, do not provide complete measurement from six years to maturity for any but those who test below I.Q. 120. Another imperfection that has been pointed out is that in the higher reaches of the scale the steps of increment are so large (four months, five months, and six months of mental age) that they cause the I.Q. of very young and gifted children to appear to fluctuate more than is the case with average children. These fluctuations in I.Q., due to imperfections in the construction of the scale, are often mistaken for intellectual development of children.

The exactitude of the I.Q. must always be qualified critically, and its practical application must be made cautiously. Binet himself adhered persistently to the mental-age concept, and carefully qualified even this concept. In 1905, he made a statement to the effect that his scale of intelligence, properly speaking, did not permit the measuring of intelligence, because intellectual qualities are not superposable and, therefore, cannot be measured as linear surfaces are measured, but are, on the contrary, a classification or hierarchy among devious intelligences; and for the necessities of practice this classification is equivalent to a measure.

¹ See Hollingsworth, *op. cit.*, p. 161 and chap. II, for reasons why present methods are not very reliable at ages earlier than six years.

2. Other types of tests for measuring intelligence

Performance tests. There are many types of performance tests, but their underlying principles are the same. Essentially, they are concrete problems which the child can solve without the use of language. They are now used, not only with the groups for which the language tests are inadequate, but also with normal children. They are useful in discovering the verbalist who undeservedly scores much higher on a linguistic scale. Clinical practice commonly supplements the Binet scale with a group of performance tests. In fact, many clinics consider an intelligence examination incomplete without a series of performance tests, for a more comprehensive survey of a child's mental ability can be made when various types of tests are given.

The advantage of giving both verbal and non-verbal tests lies in the fact that they do not test the same things. They supplement each other, and yield valuable diagnostic data because they both test intelligence, but different phases of it. Thorndike maintains that there are three distinct types of intelligence — the “mechanical,” the “social,” and the “abstract.” “Mechanical” intelligence he describes as the ability to learn, to understand, and to manage things and mechanisms. “Social” intelligence he considers as the ability to act wisely in human relations. “Abstract” intelligence he defines as the ability to understand and to manage ideas and symbols. Terman holds that if intelligence is the ability to think in abstract ideas, then it is to be expected that the most successful intelligence tests will be those which involve the use of language or other symbols. Other specialists hold that performance tests reveal a type of intelligence which plays an important rôle in practical work that should be valued as highly as any abstract mental work. It is, perhaps, safe to say that a performance test is a better measure of “mechanical” intelli-

gence, and the verbal test a better measure for "abstract" intelligence.

In clinical work the two types of tests are usually given in order to discover four general types of children, namely:

1. Children who do well in both performance and in language tests.
2. Children who do poorly in both types of tests.
3. Children who do well in language tests, but do not do as well in performance tests.
4. Children who do exceptionally well in performance tests, but make very low ratings in the language tests.

The first class of children are considered superior and will be able to adapt themselves to environment quite readily. Children in the second class are of inferior intelligence; test findings of one type of test confirm the findings of the other type. When each of two different types of tests does not find the child to have high intelligence, the accuracy of

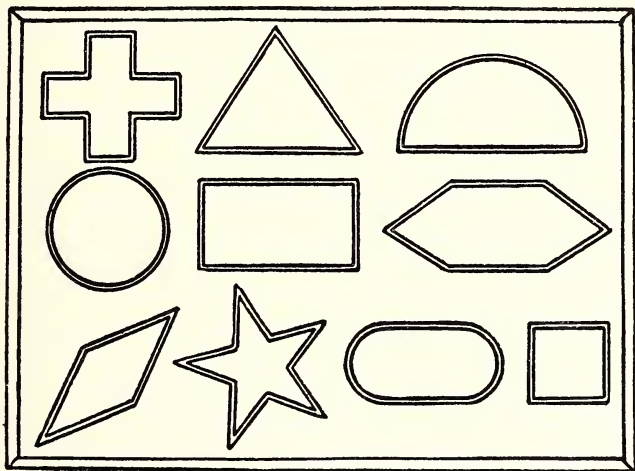


FIG. 8. THE VINELAND-SEGUE FORM BOARD

(H. H. Goddard's modification.) The blocks are removed, and the subject is urged to replace them as rapidly as possible.

diagnosis may be strengthened. Children in the third and the fourth class respectively have specialized abilities, and diagnosis can be based upon the degree of discrepancy between the two types of test ratings.

A few commonly used performance tests will be described briefly in order to show their general principles.

Various types of form boards have been standardized for use as intelligence or performance tests. Wooden insets of various shapes and sizes are designed to fit into corresponding recesses of a board. The Seguin and Goddard Form

Board has recesses to hold ten insets of different geometrical designs. Norms for the time required to fit the insets into the recesses are established for various age levels.

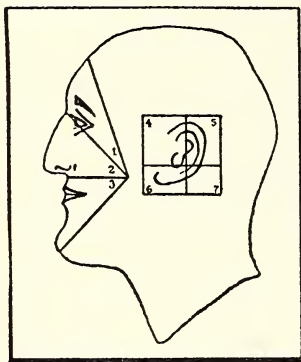


FIG. 9. KNOX-KEMPF FEATURE PROFILE TEST

(Courtesy of C. H. Stoelting Company.)

The profile test. This test was first described by Knox.¹ It consists of a man's head cut out of wood. The face is cut away and is divided into three pieces — mouth, nose, and eye. The ear is cut out and divided into four irregular pieces. The material is placed

before the subject without telling him what the figure is intended to represent.

The manikin test. The manikin test was first used by Pintner² as a test similar to the profile test, but it is better adapted for younger children. The material consists of the

¹ Knox, H. A. "A Scale, Based on the Work of Ellis Island, for Estimating Mental Defect"; in *Journal of the American Medical Association*, vol. 62, p. 741.

² Pintner and Paterson. *A Scale of Performance Tests*, p. 53. D. Appleton and Company, 1917.

figure of a conventional man cut out of wood and divided into six pieces — head, body, the two arms, and two legs. The joints of the leg and arm on one side of the body are rectangular and on the other side circular, so that neither the arms nor the legs are interchangeable.

The Kohs block design test. This test, according to its designer Kohs,¹ is essentially a test involving mental analysis and synthesis which Kohs considers the fundamental characteristics of all intelligence. It is claimed that the block design tests analytico-synthetic ability at ever higher levels as the designs increase in difficulty and complexity. The test material consists of sixteen one-inch cubes, having their six surfaces painted red, blue, white, yellow, and red and white divided diagonally. A series of designs, colored with the same colors found on the block surfaces, is also provided. The child is required to duplicate the card designs with the cubes. The simpler designs require but four cubes, and the more complicated require sixteen.

The Knox cube test. This test material consists of four one-inch cubes mounted on a strip of wood, so that they are about two inches apart. A fifth cube is used by the examiner and the subject for tapping the mounted cubes. The examiner taps out various patterns on the four cubes, and the subject is then required to tap the cubes in the same order. The twelve patterns of taps gradually increase in complexity. In the first pattern each cube is tapped but once, in the second group five taps comprise the patterns; in the last group, six taps comprise the patterns.

Group tests of intelligence. The intelligence tests just described, of both the verbal and the performance types, must be given to subjects individually by trained examiners. To meet the need of measuring the intelligence of large

¹ Kohs, S. C. *Intelligence Measurement*. The Macmillan Company, 1923.

FIG. 10. A PAGE FROM THE ARMY ALPHA

TEST 3

This is a test of common sense. Below are sixteen questions. Three answers are given to each question. You are to look at the answers carefully; then make a cross in the square before the best answer to each question, as in the sample:

{ Why do we use stoves? Because
 SAMPLE { ☐ they look well
 ☐ they keep us warm
 ☐ they are black

Here the second answer is the best one and is marked with a cross. Begin with No. 1 and keep on until time is called.

1	It is wiser to put some money aside and not spend it all, so that you may <input type="checkbox"/> prepare for old age or sickness <input type="checkbox"/> collect all the different kinds of money <input type="checkbox"/> gamble when you wish	4	The main reason why stone is used for building purposes is because <input type="checkbox"/> it makes a good appearance <input type="checkbox"/> it is strong and lasting <input type="checkbox"/> it is heavy
2	Shoes are made of leather, because <input type="checkbox"/> it is tanned <input type="checkbox"/> it is tough, pliable and warm <input type="checkbox"/> it can be blackened	5	Why is beef better food than cabbage? Because <input type="checkbox"/> it tastes better <input type="checkbox"/> it is more nourishing <input type="checkbox"/> it is harder to obtain
3	Why do soldiers wear wrist watches rather than pocket watches? Because <input type="checkbox"/> they keep better time <input type="checkbox"/> they are harder to break <input type="checkbox"/> they are handier	6	If some one does you a favor, what should you do? <input type="checkbox"/> try to forget it <input type="checkbox"/> steal for him if he asks you to <input type="checkbox"/> return the favor

- 7 If you do not get a letter from home, which you know was written, it may be because
☐ it was lost in the mails
☐ you forgot to tell your people to write
☐ the postal service has been discontinued
- 8 The main thing the farmers do is to
☐ supply luxuries
☐ make work for the unemployed
☐ feed the nation
- 9 If a man who can't swim should fall into a river, he should
☐ yell for help and try to scramble out
☐ dive to the bottom and crawl out
☐ lie on his back and float
- 10 Glass insulators are used to fasten telegraph wires because
☐ the glass keeps the pole from being burned
☐ the glass keeps the current from escaping
☐ the glass is cheap and attractive
- 11 If your load of coal gets stuck in the mud, what should you do?
☐ leave it there
☐ get more horses or men to pull it out
☐ throw off the load

- 12 Why are criminals locked up?
☐ to protect society
☐ to get even with them
☐ to make them work
- 13 Why should a married man have his life insured? Because
☐ death may come at any time
☐ insurance companies are usually honest
☐ his family will not then suffer if he dies
- 14 In Leap Year February has 29 days because
☐ February is a short month
☐ some people are born on February 29th
☐ otherwise the calendar would not come out right
- 15 If you are held up and robbed in a strange city, you should
☐ apply to the police for help
☐ ask the first man you meet for money to get home
☐ borrow some money at a bank
- 16 Why should we have Congressmen? Because
☐ the people must be ruled
☐ it insures truly representative government
☐ the people are too many to meet and make their laws

numbers of children, various forms of group tests have been devised which may be administered by competent people without special training.

1. *The Army Alpha.* Group tests are comprised of both the verbal and the non-verbal types; many include both types of material. The Army Alpha, devised by a group of American psychologists and given to more than a million men in the American army during the World War, is the most familiar group test of the verbal type. The committee in charge of the construction of the army group examination adopted twelve criteria for judging the appropriateness of the individual tests,¹ namely: (1) adaptability, (2) validity, (3) range of intelligence measured, (4) objectivity of scoring, (5) rapidity of scoring, (6) unfavorableness to coaching, (7) unfavorableness to malingering, (8) unfavorableness to cheating, (9) independence to schooling, (10) minimum of writing in responses, (11) interest and appeal, (12) economy of time.

With these criteria in mind 212 separate questions, exercises, and problems of eight general types were incorporated into the Army Alpha group examination. The eight types of tests represented are as follows:

Test 1. Oral directions	Test 5. Disarranged sentences
Test 2. Arithmetical reasoning	Test 6. Number of series completion
Test 3. Practical judgments	Test 7. Analogies
Test 4. Synonym antonym	Test 8. Information

Figure 10 shows test 3 of the Army Alpha.

2. *The Army Beta.* This test was devised at about the same time for use with illiterates. This examination was given by pantomime and required no knowledge of the English language on the part of those examined. The Army

¹ *Memoirs of the National Academy of Sciences*, vol. 15, pp. 299-300. Washington, D.C., 1921.

Alpha and Beta have both been used to examine school children.

Other group tests extensively used are the National Intelligence Tests, Haggerty Intelligence Examination, Illinois General Intelligence Scale, Terman Group Test of Mental Ability, Otis Group Intelligence Scale, Pressey Intermediate Classification Test, and many others.

Rural children and the I.Q. Comparisons of pupils in cities with pupils in small towns or in the country uniformly find the city children to attain higher scores than rural children. One investigation,¹ in which 2800 city children and 538 rural children were compared, was summarized in terms of the percentage of rural children who excelled the median of city children. The percentages at various ages were as follows:

TABLE IV. PERCENTAGE OF COUNTRY CHILDREN MAKING SCORES ABOVE THE MEDIAN OF THE CITY CHILDREN

	Age			
	10	11	12	13
Per cent.	29	33	21	25

A similar study² comparing high-school seniors in city and in rural schools found that, while differences still existed between the two groups, they are not so great as the reported differences for elementary schools. This superiority of city children may be indicative of superior training, since the differences become less as the amount of training increases.

Intelligence and race. The question of the relative intelligence of various races is always of interest in cosmopolitan centers and in schools having racially diverse pupilage.

The most extensive race study of intelligence has been

¹ Pressey, S. L., and Thomas, J. B. "A Study of Country Children in (1) A Good and (2) A Poor Farming District, by Means of a Group Scale of Intelligence"; in *Journal of Applied Psychology*, vol. 3, pp. 283-86. (1919.)

² Book, W. F. *The Intelligence of High-School Seniors*. The Macmillan Company, 1922.

the comparison between Negroes and whites in the army. Table V shows a comparison of the letter distribution of

TABLE V. COMPARISON OF THE SCORES OF WHITES AND NEGROES ON ARMY ALPHA ¹

Composition of group	Score in letter grades		
	D and D - (per cent)	C -, C and C + (per cent)	A and B (per cent)
Whites, five Northern camps.....	19.4	67.6	13.1
Negroes, five Northern camps.....	45.3	51.1	3.6
Whites, five Southern camps.....	34.8	56.8	8.6
Negroes, five Southern camps.....	78.7	20.6	.7

scores in Army Alpha between five Northern and five Southern army camps during the World War.

According to this table, over twice as many Negroes made as low scores as were made by whites of the same region of the country. Moreover, the percentage of whites over Negroes making high scores is much greater. The great differences in the scores of Northern and of Southern men shown in the table cannot be attributed to race, but to other factors, perhaps educational or other environmental influences. The relatively constant differences in scores between the racial groups in various geographic sections of the country may be interpreted as possible racial differences in native intelligence, as measured by the Army Alpha.

A comparison of white with Negro children found a similar difference in favor of the whites, both when colored and white children in a favored district and in a mill district were measured by the Binet-Simon Scale.² The findings, summarized in Table VI, show that the Negro children were

¹ Yerkes, R. M. *Psychological Examining in the United States Army*, pp. 679-719. Washington, 1921.

² Strong, Alice C. "Three Hundred Fifty White and Colored Children Measured by the Binet-Simon Measuring Scale of Intelligence: A Camp Study"; in *Pedagogical Seminary*, vol. 20, pp. 485-515. (1913.)

found to be below the white children of the district, and much below the white children of the favored district.

TABLE VI. RATING DISTRIBUTION OF THREE GROUPS OF CHILDREN TESTED BY THE BINET-SIMON SCALE

Rating	Favored whites		Unfavored whites		Colored	
	Num-ber	Per cent	Num-ber	Per cent	Num-ber	Per cent
More than one year backward....	5	5.3	11	18.3	21	25.6
Satisfactory.....	80	84.2	49	81.6	61	74.4
More than one year advanced....	10	10.4		0		0

Another study ¹ found a marked racial difference in both verbal and non-verbal group tests. Findings show that the language test does not place Negro children at a disadvantage; they make low scores in both types of tests.

Investigations of the intellectual status of the American Indian, as measured by intelligence tests, show uniformly that Indians attain scores even lower than do Negroes. Two studies found that the pure-blood Indian stood lowest in intelligence, while those of mixed blood stood higher in proportion to the amount of white blood in their veins. The following table is a summary of one representative study: ²

TABLE VII. OTIS TEST SCORES OF INDIANS OF DIFFERENT DEGREES OF BLOOD MIXTURE

Percentile	One fourth blood	One half blood	Three fourths blood	Pure blood
25.....	77.25	68.0	56.31	35.8
50.....	109.3	91.47	77.75	67.46
75.....	127.9	117.9	108.3	94.35
Number of cases.....	112	192	142	265

¹ Sunny, Dagne. "Comparison of White and Negro Children in Verbal and Non-Verbal Tests"; in *School and Society*, vol. 19, p. 467. (1924.)

² Hunter, W. S., and Sommermeier, Eloise. "The Relation of the Degree of Indian Blood to Score on the Otis Intelligence Test"; in *Journal of Comparative Psychology*, vol. 2, pp. 257-77. (1922.)

The Indians tested were students at Haskell Institute, and were therefore a somewhat selected group. They represented sixty-five tribes, and fourteen tribal mixtures. The comparison of their scores with those made by whites show, according to the investigators, that 85 per cent of the Indians tested below age. The correlation between the score and the amount of white blood, including pure whites, was found to be .51, when age and schooling were constant.

Comparisons of other races were made by studying children of various immigrant groups. Children similar in respect to possible language handicaps and social environment were tested in order to discover whether inherent racial differences exist. A summary of one study ¹ in which four racial groups were compared is presented in Table VIII. In this study the Italian group made lower scores than any of the other groups; only 15 per cent equaled the median score of the Jewish and the American group.

TABLE VIII. MEDIAN SCORES OF CHILDREN OF FOUR RACIAL OR NATIONAL GROUPS

Race of group	Number of cases	Age						
		9	10	11	12	13	14	15
Jews.....	500	109.0	109.3	118.4	128.5	125.5	124.3	126.5
Italians.....	500	73.5	84.3	94.8	105.5	109.5	109.5	113.5
Americans....	230	108.5	108.5	118.0	127.0	131.0	128.5	120.0
Negroes.....	500	106.5	112.5	106.0	112.5	115.5	108.0	106.3

Chinese children in the United States have been found to compare favorably with white children. One investigator ² states that the mentality of the Chinese children is much nearer the norm for American white city children than is that of the Negro children or of rural white children.

¹ Murdoch, Katherine. "A Study of Race Differences in New York City"; in *School and Society*, vol. 11, pp. 147-50. (1920.)

² Pyle, W. H. "A Study of the Mental and Physical Characteristics of the Chinese"; in *School and Society*, vol. 8, pp. 264-69. (1918.)

Moreover, if allowance is made for language difference, he believes that the mentality of Chinese children would equal that of American whites. These findings have been substantiated by other studies.

Differences due to racially different ways of showing intelligence and to differences in social status. Data showing differences on intelligence tests among races must not, however, be interpreted as offering conclusive evidence that there are actual differences in intelligence among races. Quite possibly there are no racial differences in general intelligence. We cannot measure the abstract entity of intelligence directly; we measure the performances through which intelligence manifests itself. It may well be that different races use different ways of showing intelligence and intelligence tests standardized for one race would then not be adapted for measuring the intelligence of other races.

In comparing test findings among children of different races we must bear in mind also that differences in social status will be present. On the average, white children of the "lower" classes have lower intelligence ratings than children of "higher" classes. Undoubtedly similar differences are present among children of different social status in other races. In our comparative studies white children are usually compared with children of other races belonging to lower social status.

Thus, the differences found in the studies mentioned above may be due to the fact that tests standardized for white children were used to test children of other races or that differences found are due to differences in social status rather than to actual racial differences.

Intelligence and schooling. As a rule we infer a correlation between the amount of schooling an individual has had and intelligence-test scores. The most extensive data

on this point have been gathered from the army tests. A compilation of median scores of groups of men whose records showed they had completed four grades, eight grades, high school, and college, respectively, is given in Table IX.¹

TABLE IX. AVERAGE SCORES IN ARMY ALPHA MADE BY MEN WITH DIFFERENT AMOUNTS OF SCHOOLING

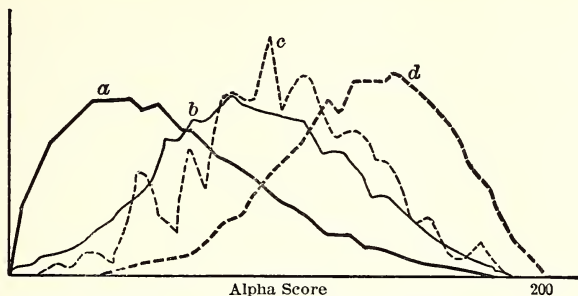
Group	School grade completed					
	0-4	5-8	High school	College	Beyond college	Total score
White officers	112.5	107.0	131.1	143.2	143.5	139.2
White draft native	22.0	51.1	92.1	117.8	145.9	58.9
White draft foreign	21.4	47.2	72.4	91.9	92.5	46.7
Colored draft, North	17.0	37.2	71.2	90.5		38.6
Colored draft, South	7.2	16.3	45.7	63.8		12.4

A comparison of averages in horizontal rows shows that with but one exception, in the case of officers, the men who have had more schooling made higher scores. The increase in test scores with increase of schooling is commonly interpreted to mean, not that schooling increases native intelligence, but that amount of schooling is usually correlated with degree of intelligence. Undoubtedly, too, schooling was responsible for large differences in the scores found in these groups. A comparison of the vertical scores shows that officers with little schooling made higher scores than drafted men with more schooling. Native capacity, perhaps, is entirely responsible for these differences.

Figure 11 gives a comparison of four groups of army men, namely, all enlisted men, enlisted men over eighth grade, officers below eighth grade, and all officers. The main conclusions, among others, derived from a comparison of the frequency-distribution curves of this figure are that Army

¹ From the *Army Report*, assembled by Freeman, F. N., in his *Mental Tests*, p. 465. Houghton Mifflin Company, 1926.

Alpha scores were affected, perhaps about equally, by differences in schooling and by differences in intelligence.



a. All enlisted men. b. Enlisted men, over eighth grade.
c. Officers, below eighth grade. d. All officers.

FIG. 11. DISTRIBUTION OF ALPHA SCORES OF OFFICERS AND ENLISTED MEN, WITH MORE THAN EIGHTH-GRADE OR LESS THAN EIGHTH-GRADE SCHOOLING

(From *Army Report*, pp. 765, 779.)

The misinterpretation of intelligence ratings. Before leaving the topic of the measurement of intelligence by the use of formal tests, we must stress the point that these tests are of greatest value for diagnostic purposes when other data are not available, and when administered by psychologists trained in giving and in interpreting them. The fallibility of mental tests is now recognized, and we are considering them more sanely and more scientifically than we did a few years ago when intelligence tests were ascribed almost magical powers, and when the intelligence tester's ability to make scientific observations and interpretations was overestimated. The hesitancy in taking mental tests shown by successful adults may be interpreted as a lurking lack of confidence in the tests as well as in the testers. A few courses in psychology does not make a psychologist any more than a few courses in physics makes a physicist. The result is that many intelligence testers misinterpret or fail to

interpret intelligence ratings. G. Stanley Hall's experience with intelligence tests offers a good illustration of this. In summary, his experience was as follows:¹

First of all, he [G. Stanley Hall] tried a well-known assembling test which has been largely used in the army but was new to him. After fifty minutes, he failed to complete the work, "but all these stunts were done in the eight minutes by an assistant in the laboratory workshop." Then he took up one of Thurston's tests for freshmen entering college. The time allotted was twenty minutes, and Hall succeeded in completely mastering it in thirty-eight minutes. On the second Thurston test, however, he fell down. After fifty-four minutes of hard work, there remained several questions which he could not answer. "Here," Hall says, "my time was about twice too long so that my marks should be about fifty on the scale of 100 — and from this should be discounted failure to answer five per cent of the questions."

As a result of this bad showing, Hall felt that he had been too ambitious, so he took up Meyers's tests for young children in the grades. He was told to draw "a line from a first circle to the last circle that shall pass below the second and fourth circles and above the third and fifth circle" and much more of the same thing. Here he scored another failure. He was required, as he said, to hold in memory, after one hearing, about fifty words, and this he couldn't do. His failure here was almost complete.

Then Hall went to the Otis and National tests. "Here I could not and cannot find a word which is exactly the opposite of 'because' or of 'if.'" With Kuhlmann's tests, he scored a "rather low psychological age," and with Bonser's reasoning test he was outclassed by a girl of twelve.

The tests of Pintner, McCall, Munroe, Haggerty, Trabue, the Ohio tests for students, the Downey will-profile, and the Seashore's tests for music, in which he had always had an amateurish interest and considerable ability, gave him no comfort. Finally, as Hall says, he came on De Sanctis's fool-finding tests, which convinced him that he was not quite a moron.

Occasionally an experience with mental tests similar to Hall's is rumored for the ostensible purpose of discrediting

¹ G. Stanley Hall, in *Plain Talk*, November, 1927, as summarized by Swift, E. J., *The Psychology of Childhood*, pp. 4-7-8. D. Appleton and Company, 1930.

the value of mental tests. In these cases the emphasis, as a general rule, should be placed, not upon the shortcomings of the tests, but upon the shortcomings of the testers. It is perhaps safe to say that all such cases were tested by inexperienced testers, not by psychologists in good repute. A psychologist observing Hall while he performed his tests, analyzing his "mental set," and noting overcritical tendencies and the effects of failure, would have a different explanation of the low ratings.

By overcoöperation it is possible for a superior adult to make a rating lower than his abilities warrant. This point is usually unobserved by the inexperienced tester. Thus, in one instance a superior adult consented to take a mental test in order to give a tester in training an additional practice case and made a lower rating than was expected. Analysis of this case showed that the subject lowered her rating by the following readily discovered facts:

1. Not guessing at any words in the vocabulary test, even though she was fairly certain of some. Experience with tests penalizing guessing and wrong answers led to this.
2. The stop-watch in the tester's hands and the tester's nervousness led the subject to infer that all items were scored on the time basis; undue haste resulted in many cases.
3. The mental set of the subject was not directed toward obtaining a high score, but toward giving the tester an opportunity practice and experiment.
4. Overestimating the tester's ability to comprehend interpretations.

Failure on the tester's part to note these factors was evidence of her non-scientific method, as was also her readiness to inform the public of the unexpectedly low rating.

3. *The physiological basis of intelligence*

The intellect is approached through physical avenues, and also expresses itself through physical avenues. Since in the

case of exceptional children we must often deal with the physical in diagnostic and in remedial work, it behooves us to keep in mind the principal facts in regard to the physiological basis of intelligence.

The physiological basis of intelligence. The brain and the nervous system, composed of neurones with specialized functions, comprise the physiological basis of intelligence. Differences in the neurones' readiness to function in characteristic manner determines, perhaps, various degrees of intelligence. Just what the intrinsic individual differences in neurone composition may be is not known. Post-mortem examinations of neurones of normal individuals of varied intelligence have revealed, in general, no differences in size, shape, structural arrangements, or composition. It is thought, however, that differences in sensitivity to and conductivity of impulses, and the ability and readiness for forming many proper contacts must exist in neural association centers, and it is thought that these differences are the physiological bases of intellectual differences. Just as any physiological condition can be inherited, so also is the physiological structure basic to intelligence inheritable.

The neurone. The unit of the nervous structure is the *nerve cell*. Like other cells of the body it contains a *nucleus*, a mass of *protoplasm*, and a *cell wall*. Typically the neurone has a diameter of about one two-hundredth of an inch. It has two processes — the dendrite, which is rather short, tapering, and branched like a tree, and the axon, which is longer and usually has short branches at right angles (collaterals) and an end tuft of tiny fibrils. Neurones differ very much in size and shape. Some resemble long trailing vines and some look like baskets or irregular spiders. Although the fibers are remarkably small in diameter, they are often over a yard long, as when they reach to the tip of the toe or other distant parts of the body.

There are three types of neurones: the sensory, the motor, and the associative or connective. The sensory neurones are those that bring impulses toward the cord or brain, as from the retina of the eye or the organ of Corti of the ear. The motor neurones are those that carry impulses from the cord or brain; they may stimulate a muscle or a gland. The associative neurones connect the motor and the sensory neurones.

The whole nervous system is practically nothing more than the sum total of its millions upon millions of neurones. Accessory structures are present, of course. Fibrous connective tissue enmeshing the neurones is present, together with lymph in which they are bathed, as well as blood vessels carrying them nourishment. The sensory neurones are scattered throughout the sensitive periphery. There are hundreds of thousands ending freely in the skin or terminating in microscopic end organs, as in the retina of the eye, in the organ of Corti of the ear, in the mucous membrane of the nose and mouth, etc.; all the neurones which generate

and transmit an inward-going impulse are sensory. The motor neurones supply the muscles of the body. They carry impulses outward. Responses as varied as the reflex eye-wink to skating are the results of motor nerve discharge. The associative neurones are neither motor nor sensory; they are

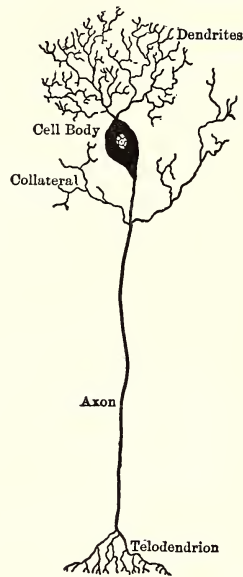


FIG. 12. THE NEURONE AND ITS PARTS

The large black mass is the cell body. The shorter irregular branches above are the dendrites, the receiving branches. The long and more extended branch running downward is the axon, the sending branch. (From Warren's *Human Psychology*.)

central both in position and in function and lie between and about the neurones which receive and discharge stimuli. The function of the associative neurones is to centralize, organize, adjust, inhibit, regulate, and to record stimuli. Their characteristic plasticity enables them to retain past experiences and to modify present reactions in terms of present stimuli as well as in terms of the past and even of the future. The bulk of the brain consists of associative neurones.

The synapse. The neurones are microscopically close together, and their fibers interlace much like the roots or branches of juxtaposed trees. The region where the arborized fibers of one neurone appear to join those of another neurone is called a *synapse*. It is commonly thought that there is no actual physical junction at the synapse, but that the synaptic area is really a gap. In some way the impulses traveling along one nerve must bridge this synaptic gap and continue along the fibers of the appropriate adjacent neurone.

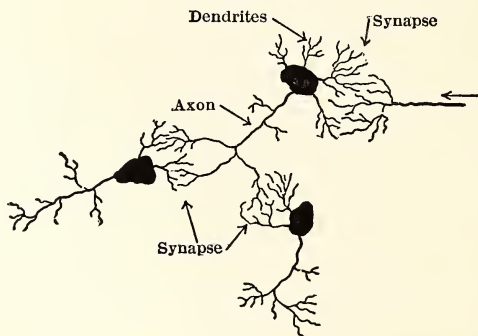


FIG. 13. THREE SYNAPSES OR "SYNAPTIC CONNECTIONS"

From Gates's *Psychology for Students of Education*. By permission of the Macmillan Company, publishers.

In general, the nerve cells are grouped together into the central nervous system; that is, the brain and the spinal

cord. Smaller masses, called *ganglia*, are located in other parts of the body where they can more conveniently control certain physiological functions.

The brain. The brain may be roughly divided into three major divisions, the *medulla*, or mid-brain, the *cerebellum*, and the *cerebrum*. The medulla is the upward continuation of the spinal cord. It is about an inch long and one half inch

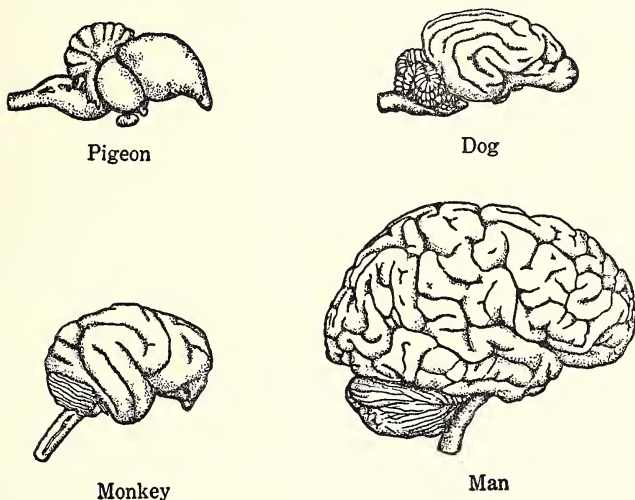


FIG. 14. BRAINS OF VERTEBRATES

Note the relative size of the cerebellum in the bird and the mammals. In the mammals, note the great increase of cerebrum and the increasing amount of convolutions, or wrinkling, of the brain surface. The greater brain area in the higher animals corresponds to greater numbers of association neurons, and thus to greater intelligence. (From Gruenberg's *Biology and Human Life*. Ginn & Company.)

thick; it is the seat of vital and reflex centers. The cerebellum, or little brain, is situated beneath the occipital lobes of the cerebrum. It is thought that the cerebellum is the organ for maintenance of equilibrium and for the coördination of the voluntary movements, but the extent of muscular coördination dependent upon this division of the brain is not

definitely known. The cerebrum, or brain proper, constitutes in man the largest part of the entire brain. Its shape conforms to that of the cranial cavity. A deep fissure runs lengthwise, separating it into two equal hemispheres. At the bottom of the fissure a broad band of fibers unites the two hemispheres. The surface of each hemisphere is folded into numerous folds known as *convolutions*. These convolutions increase the actual surface of the brain without increasing its size. In the mammalian scale the number and extent of convolutions are in direct relation to the intellectual development and reach their highest complexity in civilized man. It is in the cerebral hemispheres — more accurately in the cortex or the outer covering of the cerebrum — that those activities which are recognized as consciousness, intellect, emotions, and will are centralized. The relative size of the cerebrum in vertebrates corresponds to the relative amount of intelligence possessed by the species. (See Fig. 14.)

Cortical areas. Neurologists have very carefully mapped out the cortex of the cerebral hemispheres into various areas, using many of the depressions as boundary lines. The four main lobes of each hemisphere have been conveniently named the *Frontal* (in the forehead), the *Temporal* (at each temple), the *Occipital* (at the back), and the *Parietal* (at the top). The two main fissures — the *Central*, which divides the front from the back part of each hemisphere, and the *Fissure of Sylvius*, which runs from the temple toward the rear — mark off the Temporal lobe.

When nerve impulses are initiated in the sense organs of the body, they are relayed by neurones until they arrive at *sensory areas* in the cortex. The sensory areas connected with the important sense organs are fairly definitely established. The impulses coming in from the eye are relayed to an area of the cortex in the Occipital lobe, impulses

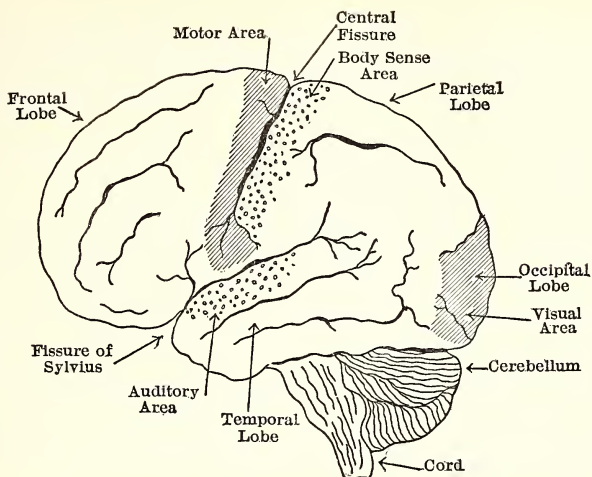


FIG. 15. SIDE VIEW OF THE LEFT HEMISPHERE OF THE BRAIN
Showing the important fissures and lobes, and the visual, auditory, and body sense areas.

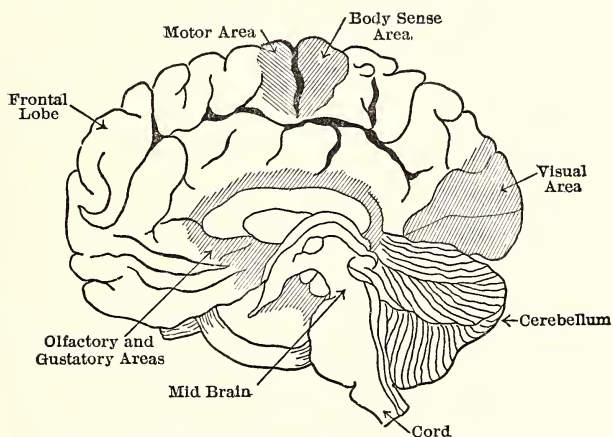


FIG. 16. THE INNER (MESIAL) SURFACE OF THE RIGHT
HEMISPHERE
Showing parts concealed in Figure 15. The olfactory and gustatory areas are shown.

from the ear are relayed to an area in the Temporal lobe, those of taste to an area near the bottom of the cleft between the two cerebral hemispheres, and so on, as is shown in Figures 15 and 16.

Destruction or injury of various sense areas results in loss or disturbance of the corresponding sensations. Thus, destruction of the visual area results in blindness, even though the visual end organ and its sensory nerves are intact. When a particular sense area is uninjured, but the area surrounding it is destroyed, the corresponding sensation is intact, but the ability to recognize, comprehend, or interpret the sensation is not present. Thus, when the visual area is uninjured, but the surrounding area is destroyed, the patient can see objects, but has no idea what the stimulating object is; an apple may be called a clock, a hat may be called a horse. In some cases words can be seen, but cannot be interpreted. The visual stimulus arouses but one conscious response, the sensation. Percepts, images, memories, and thoughts are not stimulated. Similarly, if the cortex surrounding the auditory area is destroyed without injury to the area itself, the patient is aware of sounds but is unable to comprehend or to interpret them. Tunes can be heard but not recognized; spoken words can be heard but not understood.

Lashley's theory of equipotentiality of cerebral action. On the basis of extensive experimentation, Lashley¹ has formulated a general theory of equipotentiality of cerebral action. The effects of cerebral lesions of varying magnitude upon the learning and the retaining of a variety of problems were noted in the case of white rats. In all cases the areas of cortical injury were plotted carefully (Fig. 17) and the time, errors, and number of trials required in learning or

¹ Lashley, K. S. *Brain Mechanisms and Intelligence*. University of Chicago Press, 1929.

relearning a problem were noted. Lashley found significant correlations between the amounts of practice required for learning and for relearning by animals subjected to brain

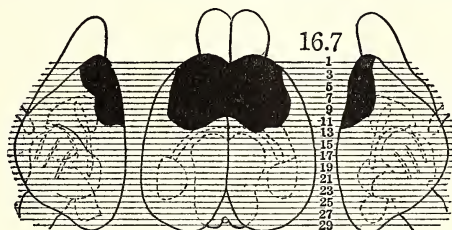


FIG. 17. DIAGRAM SHOWING THE AREA OF BRAIN LESION IN WHICH 16.7 PER CENT OF THE CORTEX WAS DESTROYED

This is but one of a very large number of cases in which varying amounts of cortical lesions were made. (After Lashley.)

injuries after initial training. His findings for one maze problem (Maze III) are shown in the following table:

TABLE X. AMOUNTS OF PRACTICE REQUIRED FOR RELEARNING A MAZE BY ANIMALS SUBJECTED TO BRAIN INJURIES AFTER INITIAL TRAINING

Per cent of destruction	Time	Errors	Trials
1- 5.....	14	1	0.4
5-10.....	98	8	2.8
10-15.....	669	94	20.8
15-20.....	3532	329	67.1
20-25.....	2776	305	61.4
25-30.....	3395	355	79.1
30	5613	769	108.5

From a great number of similar tables Lashley drew the following inferences:

1. The learning process and the retention of habits are not dependent upon any finely localized structural changes within the cerebral cortex. The results are incompatible with theories of learning by changes in synaptic structure, or with any theories which assume that particular neural inte-

grations are dependent upon definite anatomical paths specialized, for them. Integration cannot be expressed in terms of connections between specific neurones.

2. The contribution of the different parts of a specialized area or of the whole cortex, in the case of non-localized functions, is qualitatively the same. There is not a summation of diverse functions, but a non-specialized dynamic function of the tissue as a whole.
3. Analysis of the maze habit indicates that its formation involves processes which are characteristic of intelligent behavior....
4. The mechanisms of integration are to be sought in the dynamic relations among the parts of the nervous system rather than in details of structural differentiation.

Inasmuch as Lashley's theory rests almost solely upon data gathered on the maze habit, there is some objection to the generalization.¹

SELECTED REFERENCES

1. Arthur, G. "A New Point Performance Scale"; in *Journal of Applied Psychology*, pp. 390-416. (1925.)
2. Bronner, A. F., Healy, W., Lowe, G. M., and Shimberg, M. E. *A Manual of Individual Mental Tests and Testing*. Little, Brown, and Company, 1927.

¹ W. S. Hunter, in "A Consideration of Lashley's Theory of the Equipotentiality of Cerebral Action"; in *The Journal of General Psychology*, October, 1930, pp. 455-68, calls attention to the fact that the maze habit is essentially controlled by a multiplicity of stimuli rather than by a central neural engram as Lashley infers. Hunter says that Lashley's data "do not demand a radical revision of our current theory of neural action. I think of three possible ways of interpreting Lashley's data: Lesions of the cerebral cortex fail to reveal a localized control of the maze habit because: (a) the cortex is equipotential. (b) there are many sensory projection areas involved in maze control and the lesions do not affect all of them, or (c) the maze habit is controlled by multiple stimuli, but the neural integrations are made primarily at sub-cortical levels. The first possibility is the one that Lashley adopts, whereas I submit that either of the other two possibilities is in greater harmony with the data derived from studies of the sensory control of the maze."

3. De Sanctis, S. "Mental Development and the Measurement of the Level of Intelligence"; in *Journal of Educational Psychology*, pp. 498-507. (1911.)
4. Doll, E. A. "The Growth of Intelligence"; in *Journal of Educational Psychology*, vol. 10, pp. 524-25. (December, 1919.)
5. Freeman, F. N. *Mental Tests*. Houghton Mifflin Company, 1926.
6. Herring, J. P. "Herring Revision of the Binet-Simon Tests"; in *Journal of Educational Psychology*, pp. 172-79. (1924.)
7. Kuhlmann, F. "The Results of Repeated Mental Reëxaminations of 639 Feeble-minded over a Period of Ten Years"; in *Journal of Applied Psychology*, vol. 5, pp. 195-224. (September, 1921.)
8. Kuhlmann, F. *A Handbook for Mental Tests*. Warwick and York, 1922.
9. Peterson, J. *Early Conceptions and Tests of Intelligence*. World Book Company, 1925.
10. Pressey, S. L. and L. C. *Introduction to the Use of Standard Tests*. World Book Company, 1922.
11. Rugg, H., and Colloton, C. "Constancy of the Stanford-Binet I.Q. as Shown by Retests"; in *Journal of Educational Psychology*, vol. 12, pp. 315-22. (June, 1921.)
12. Terman, L. M. *The Measurement of Intelligence*. Houghton Mifflin Company, 1916.
13. Terman, L. M. *The Intelligence of School Children*. Houghton Mifflin Company, 1919.
14. Thorndike, E. L. "Measurement of Intelligence — The Present Status"; in *Psychological Review*, pp. 219-52. (1924.)
15. Wells, F. L. *Mental Tests in Clinical Use*. World Book Company, 1927.
16. Whipple, G. M. "Endowment, Maturity, and Training as Factors in Intelligence Scores"; in *Scientific Monthly*, pp. 496-507. (1924.)
17. Young, K. "The History of Mental Testing"; in *Pedagogical Seminary*, pp. 1-48. (1924.)

CHAPTER III

MAJOR SPEECH DISORDERS

Prevalence of speech defects. A child normal intellectually, but abnormal in some other way, is able to recognize his abnormalcy. The recognition of abnormalcy in a factor, as readily observed and as frequently used as speech, leads to self-consciousness that often assumes the proportions of keenest mortification and may skew the child's whole mental outlook. Extreme nervousness resulting from ridicule, mimicry, jealousy, or unjust criticism may in turn be the cause for grave mental complications.

Specific instances of illustrious individuals who attained eminence despite speech defects are often cited as evidence that speech difficulty does not interfere with achievement. We are told that Demosthenes, Aristotle, Æsop, Virgil, Charles Lamb, Erasmus, Moses Mendelssohn, Napoleon, Darwin, Charles Kingsley, and some say George Washington, had speech defects. That their defective speech did not prevent success is evident, but we are also told that in many instances great unhappiness and mortification was experienced on account of their speech anomalies. In Biblical times Moses was painfully conscious of a speech disorder, for, when commanded to go before Pharaoh he said, "O Lord, I am not eloquent, ... but am slow of speech, and of a slow¹ tongue."

¹ Dean E. L. McCreery kindly interpreted "slow" as follows: "It is a Hebrew word, *kāhvēhēd*, and is found in the Arabic to-day; the same root as occurs in the word 'liver,' *kabdu*. The liver seems to have been named because it is the heaviest of the viscera. A comparison of the term in instances used with other words shows that while not always translated 'heavy,' yet that idea is the prevalent one in its use."

The German versions have translated the passage to read "heavy tongue"; this would be more indicative of a speech defect than mere slowness of speech.

Several extensive surveys have been conducted for the purpose of determining the prevalence of various types of defective speech. A comparison of their findings is here given in tabular form:¹

TABLE XI. PREVALENCE OF DEFECTIVE SPEECH

Investigator	Total school population forming basis of the study	Defective speech, per cent of total enrollment
Wallin.....	89,057 St. Louis school children.....	2.8
—.....	Boys over 13 in Liverpool, England.....	2.5
Conradi.....	87,440 school children of 6 cities.....	2.46
Westergaard..	34,000 Danish school children.....	2.2
Rouma.....	14,235 Belgian school children.....	11.5

Thus, with the exception of the Belgian study, there is a close agreement in regard to the percentage of school children suffering from some form of defective speech.

The number of mild defects reported in the St. Louis survey was over three times as large as the number of severe defects, namely, 1662 mild and 519 severe defects. The severity of the defects was not reported in 355 cases. Accordingly, 1.8 per cent of the total enrollment suffered from mild speech defects, and only .5 per cent from severe defects, .3 per cent not reported. The relative frequency of the different defects was found to be as follows:

Type of defect	Per cent of total enrollment
Lisping.....	1.6
Stuttering.....	.7
All other types.....	.4

The distribution of types classified as “all other types” was as follows:

Indistinct speech (often due to foreign parentage) 77.5 per cent of “all other types”.....	314 cases
Baby talk (possibly a form of lisping).....	19 cases

¹ Tabulated from Wallin, J. E. W. “A Census of Speech Defectives Among 89,057 Public School Pupils”; in *School and Society*, vol. 3, pp. 213-16. (1916.)

Speech obstruction.....	6 cases
Speech hesitation (possibly a form of stuttering)	5 cases
Mutism.....	7 cases
Southern accent.....	4 cases
Miscellaneous.....	21 cases
Unclassified.....	29 cases

Speech defects in relation to sex. Popular opinion often claims that speech defects occur about three times as frequently among boys as among girls. The St. Louis study found the ratio of speech defects in boys to girls to be less than 2 to 1. In the case of stuttering, the preponderance among the boys was particularly marked; 1.1 per cent of all the boys were found to be stutterers as against only .4 per cent of all the girls. In the case of lisping, 1.9 per cent of all the boys as against 1.3 per cent of all the girls were afflicted. The "other types" of defects obtained among .5 per cent of the boys and .3 per cent of the girls. Moreover, the severe cases of stuttering were more numerous among boys than among girls. Thirty-one and three tenths per cent of all the cases of stuttering among the boys were severe, while the severe cases among the girls amounted to only 22.5 per cent. There appeared to be no significant sex difference in regard to the severity of lisping.

Remedial procedure. Remedial treatment of speech defects is not a stabilized procedure; each city or school has developed rather individual methods. This lack of uniformity of procedure is the general tendency in regard to corrective speech work and is, perhaps, the desired condition, since the causes of the defects are so numerous and often so complicated that each subject must be studied individually and treated individually. One investigator¹ states that:

For practical purposes we have divided the speech mechanism into its four constituents; breathing, phonation, articulation, and

¹ Scripture, Mrs. E. W. "Treatment of Speech Defects"; in *Quarterly Journal of Speech Education*, vol. 6, p. 1.

thinking, and provided exercises not only for each of these, but also for bringing about a proper coördination of the four.

Horn,¹ in commenting upon the lack of established remedial procedure, says that:

We are dealing here with a grave hindrance frequently developed by the child during the pre-school period, already established as a handicap at the time he is brought to school; and the fact of the matter is that we have very little information on the subject, and, at present, very little interest in it. Modern school systems to-day subject children to physical examinations; advanced school systems subject them to mental examinations; but no school system makes a speech survey of the entering school children, a procedure which must ultimately be adopted if this problem is to be faced systematically and scientifically.

Extent of work in the city schools. An investigation² in regard to the extent of remedial care and training given to speech defectives showed that some attention is given this problem in 23 of the 68 American cities having a population of 100,000 or over. Table XII lists these cities alphabetically, and gives other pertinent data.

The investigator considers it probably safe to assume that practically no work at all is being undertaken in that proportion of the population which is not included in this urban group, since 19 of these cities are included in the group having a population of more than 250,000, and, of the 43 cities of a population less than 250,000, only 5 have work for this special group.

Percentage of successful remedial work. Although the remedial procedure followed by cities tabulated above was characterized by the same lack of uniformity shown in the variety of procedures proposed by research workers and speech specialists, there was a certain amount of agreement

¹ Horn, J. L. *The Education of Exceptional Children*, p. 198. The Century Company, 1924.

² *Ibid.*, pp. 207-08.

TABLE XII. THE CITIES WHICH MAKE SPECIAL PROVISION
FOR THE EDUCATION OF SPEECH DEFECTIVES, THE
GENERAL ENROLLMENT, AND THE NUMBER OF
CHILDREN UNDER SPECIAL CARE

(From Horn)

City	School enrollment	Number of children under special care	Number in 100,000
Boston.....	111,138	1126	798
Buffalo.....	96,228	17	18
*Cambridge.....	16,550		
Chicago.....	341,108	1344	394
Cincinnati.....	66,557	61	92
Cleveland.....	147,115	1732	118
*Denver.....	52,396		
Detroit.....	143,677	2050	1427
*Fall River.....	17,114		
Grand Rapids.....	21,980	300	1365
Los Angeles.....	160,228	371	232
Milwaukee.....	73,061	266	364
Minneapolis.....	67,619	300	444
*Newark.....	97,771		
*New Orleans.....	53,689		
*New York.....	1,033,528		
Philadelphia.....	319,263	500	157
Pittsburgh.....	90,298	375	415
*Reading.....	20,543		
Rochester.....	52,464	85	162
San Francisco.....	70,371	2000	2842
Seattle.....	60,223	200	332
St. Louis.....	108,226	120	111
St. Paul.....	35,411	300	846

* Details not available.

regarding the need for developing confidence, teaching correct breathing and the use of the speech mechanism, as well as giving some vocal exercises to overcome certain defects. For the most part, however, these cities seemed to be decidedly individualistic in regard to their methods of correcting defective speech. In view of these findings it is of especial interest and significance that all the workers in the field of defective speech claim a large percentage of cures, Seattle claims cure for 45 per cent, Chicago for 60 per cent.

Pittsburgh for 75 per cent, Boston for 92 per cent, while New York and Buffalo each claim cure for 95 per cent.¹ Since "defective speech" is a general term, these figures are not comparable. A high percentage of cures could be effected far more readily with the minor speech defects than with the major speech defects.

Denver has estimated its percentage of cures for the various types of defective speech receiving attention as follows:

Monotony	}	..... 90 per cent
Hasty speech		
Slovenly speech		
Lisping.....		75 per cent
Nasality.....		50 per cent
Stuttering	}	..... 40 per cent
Phonetic Defects		
Stammering.....		20 per cent

Grand Rapids after one year of work, which was interpreted to mean that some of the cases were under treatment for less than a year and would doubtless improve with further work, reported as follows:

	Percentage cured	Percentage improved	Percentage with slight or no improvement
All cases treated.....	44	47	9
Stutterers.....	24	60	16
Lispers.....	56	38	6
Miscellaneous.....	34	58	8

Organization of speech-correction work. In the public schools the organization of speech-correction work is quite uniform. In all cities the children afflicted with a defect of speech are taken from their regular rooms for a specific period each day or each week, and are given special work directed toward the removal of the defect. In most cases

¹ Taken from Horn, *op. cit.*, p. 210. See Horn for following two reports.

the children are also given exercises to be carried on at home, and often the regular teachers are enlisted to help the children in overcoming their handicaps.

In the larger cities special teachers usually travel about the city, either meeting the children in their own schools or meeting all the children at a number of centrally located buildings. The amount of time per week devoted to correction of speech defects varies greatly; some cities devote but twenty minutes per week to this work, while others devote three hundred minutes per week.

MAJOR SPEECH DISORDERS

1. *Stuttering*

Stuttering and *stammering* are terms often used interchangeably. Technically, *stammering* is a peculiarity of speech characterized by pathologic repetitions, accelerations, retardations, or prolongations of speech sounds. One form of stammering, the unnecessary repetition of a letter, word, or group of words is called *stuttering*. *Stammering* is a more general term and includes several types of defective speech, so that it does not have any practical value in exact definition. In order to avoid confusion, the more general term will not be used.

Definition. *Stuttering* has been defined ¹ "as an intermittent inability to produce voiced sounds accompanied by severe cramps of the diaphragm, larynx, tongue, or all three of these speech organs." The following symptoms are more or less frequently present: (1) inability to speak words, phrases, or sentences beginning with vowels; (2) repetition of consonant sounds preceding vowels; (3) tics, or muscular spasms of the face, especially blinking of the eyes; (4) general

¹ McDowell, Elizabeth D. *Educational and Emotional Adjustments of Stuttering Children*, Columbia University, Contributions to Education, no. 314, p. 1. New York, 1928.

muscular tension throughout the body, with a clenching of hands and toes; (5) back placement of the vowels; (6) glottal catches; (7) lack of rhythm in speech, resulting in irregular, jerky grouping of phrases; (8) gasping breath controlled in its emission by the muscles of the larynx.

In former times stuttering was thought to be due to an anatomical anomaly of the peripheral speech organs, and remedial work was directed by surgical treatment. A variety of surgical practices were tried on this assumption. Wedge-shaped portions were cut from the back of the tongue, the hypoglossal nerve, the frenum of the tongue, and various extrinsic and intrinsic muscles of the tongue were severed in turn. Some surgeons pierced the tongue with needles, while others advocated cauterization and blistering. Some administered embrocations of petroleum and inoculations of croton oil. Tincture of rectified alcohol, peppermint oil, and chloroform were also applied. Smoking was recommended as a sedative to the vocal cords, and for a while wooden wedges were placed between the teeth.¹

Subsequent to these more drastic methods a variety of treatments were suggested, each based upon a unique theory as to the cause of stuttering. The following letter ² from a man in Chicago, besides showing the plight of the stutterer, gives a fair summary of some typical practices advocated even at the present day as certain "cures" for stuttering:

I am now forty years old and my trouble seemed to commence when I first started to school. For the first few years I could read and recite with some difficulty, which increased until at about my ninth year I was unable to say anything at all in the schoolroom. Outside the schoolroom I could talk a little better, but for the most

¹ See Mauken, G. Hudson. "A Brief History of the Treatment of Stammering"; in *Philadelphia Medical Journal*, 1909, vol. 13, pp. 91-97. (1909.)

² From Greene, J. S. *The Cause and Cure of Speech Disorders*, p. 8. By permission of The Macmillan Company, publishers.

part made little effort to talk. When I started to work at about fifteen years of age my stuttering grew far worse and I could say practically nothing. But at home alone in my room I could not stutter if I tried to. And I am still the same way. I can talk with perfect ease when I know I am absolutely alone.

My first experience in seeking a cure was in my nineteenth year. I saw an advertisement by a phrenologist who cured stuttering. I was told to forget stuttering and develop self-esteem, etc. No help.

I then tried a man who advocated New Thought. Was told to suggest to myself that I was going to talk perfectly. It didn't work.

The next year I joined a school "class" of stutterers, but with no results.

The following year or two I took up a still more elaborate "course" from a former college professor who drilled me in vocal exercises, and emphasized the need of proper energizing of the pharynx. After it was all over I talked as badly as ever.

When about twenty-four I took a cure advertised in the Chicago papers. My instructions were to throw my head back when I talked. After a row I finally got some of my money back.

Then I tried the E — method. Was told to listen to the sound of the words and feel my lips moving. No results.

After this I answered the advertisement of a man named C—. He conducted a Bible class in addition to his stuttering business. For \$90 he told me to keep my tongue stuck up in the roof of my mouth all the time. I practiced it for a long time. It did not improve my talking.

Five years ago I took a Voice cure. Here I was told to form a groove in the center of my tongue. It did not help.

I next went to Mr. F.— who was a student of psychology at Harvard. Word reaction tests and rambling talks by him did not cure me.

My last experiment was in spiritualistic healing. I learned some very strange things, but my stuttering remained just as bad as it ever was.

... If you think after reading my letter that something can be done for me, I shall be only too glad to come to New York and try again.

Theories as to the cause of stuttering. Among the host of theories that have been advanced in regard to the cause of

stuttering, the following are typical: Stuttering is due to an anomaly of the speech organs; to a weakness of the speech mechanism; to an incoördination between respiration, articulation, and mentation; to an incoördination between respiration and articulation; to an incoördination neurosis; to an anxiety neurosis or fright inhibition; to an infective neurosis; to a condition of mental derangement; to a disturbance of cortical centers; to a psychosis; to a mental tic; to imitation; to general debilitation following serious illness; to enlarged thymus; to transitory auditory amnesia; and to mental conflicts.

Pathological autopsies have failed to reveal structural changes in the brains of stutterers, hence many of the advocated theories are groundless.

The auditory amnesia theory. Bluemel¹ advanced the auditory amnesia or auditory aphasia theory, claiming that the individual stutters on certain words because the auditory images of those words become temporarily weakened or are inhibited so that they do not rise in consciousness. Consequently, the person is unable to recall the sounds of the words, and will experience difficulty in evoking or pronouncing the words whose auditory images are weak, and stuttering will ensue. Very few stutterers, he claims, possess a good musical ear, which is also attributable to weak auditory imagery. When a person is excited, as in the presence of others, there will be a rush of blood to the brain or cerebral anæmia; each condition is said to lower the activity of the auditory center, thereby inducing auditory aphasia. The primary cause of stuttering is the auditory amnesia. Other causes, such as bewilderment, fear, auto-suggestion inhibiting the will, and so on, are secondary causes, resulting from the primary cause.

Treatment, accordingly, is directed toward the overcom-

¹ Bluemel, C. S. *Stammering and Cognate Defects*. 2 vols, 1913.

ing of the primary defect, toward strengthening the weak auditory images. The subject is trained to attend closely to the auditory sensations, to think of how the words are going to sound, to recall their sounds continually and let the "primary image" ring through the mind. The refractory images may also be awakened by acoustic sensations, especially the sound of the initial consonant; hence the subject must begin to articulate the words even if the images are not evoked. Visual and kinæsthetic associations may also strengthen the auditory images. The aim is to have the visual and motor imagery eventually supplement the auditory, so that the individual may be independent of the auditory amnesia whenever it occurs. Feeling and visualizing the articulatory movements, and observing the movements of speech organs of others and of himself in a mirror, are helpful in establishing this independence.

Morbid anxiety and fear. According to Freud¹ there is almost always a disturbing influence of something outside of the intended speech. This disturbing element is either a single unconscious thought which may come to light through a speech blunder and can be brought to consciousness only through a searching analysis, or it is a more general psychic motive, which directs itself against the entire speech. In "the stammering and stuttering of embarrassment it is the inner conflict that is betrayed to us through the disturbance of speech." Coriat,² who has supported the Freudian conception, says that the psychogenesis of stuttering is a form of an anxiety-neurosis or anxiety-hysteria which "manifests itself mentally as morbid anxiety and a consequent dread of speaking." He claims that the individual

¹ Freud, Sigmund. *Psychopathology of Everyday Life*, 1914. (Brill's translation.)

² Coriat, I. H. "Stammering as a Psychoneurosis"; in *Journal of Abnormal Psychology*, vol. 9, p. 417 ff. (1914-15.)

stutters only in the presence of certain individuals, and then only as the result of definite emotional reactions. "For the most part," he tells us, "the motivating mechanism which causes the stammering is unknown to the sufferer...the only conscious reaction being that of anxiety and fear." "Association tests" are advocated to reveal the form of morbid anxiety due to unconscious emotional complexes, because, as each complex is struck in the test, "the typical reaction of the complex indicator follows." These "complex indicators" are no logical responses, no responses, or a marked lengthening of the reaction times. At the beginning of the speech disorder, stuttering is merely a protective mechanism to prevent betrayal through speech. Certain undesirable thoughts or painful memories, usually of a sexual nature, must be kept from consciousness so that they may not be betrayed in speech. Attempting to fortify the speech organs, by laying undue emotional stress in the effort to conceal and to prevent betrayal, results in a conflict between defective speech and the situations under which defective speech is most apt to occur, thus developing into morbid anxiety and fear. In general, the fear in stuttering is considered, according to this theory, a deflection of the repressed sexual impulses or wish. "The dread of speaking to relatives or to intimate friends may be based upon the fear that the unconscious wishes may be discovered and this stimulates the unconscious anxiety, whereas with strangers speech is free because the dread of discovery is absent."

The supporters of this theory exploit dream life, claiming that the stutterer's dreams are "dreams of inadequacy with efforts at compensation (not getting there, missing trains, etc.) or typical wish-fulfillments, such as talking freely in company or addressing an assembly like an orator."

The proponents of this theory recommend purely psychological treatment for stuttering, namely, the removal of the

deeply rooted anxiety or dread from the unconscious. This, they claim, can be accomplished only through psychoanalysis.

Dunlap's modified view. Dunlap,¹ who holds a modified and expurgated view of the Freudian theory of stuttering, says that in many cases the stuttering boy has difficulty with certain words beginning with one of a small group of sounds — sounds with which certain obscene words, much favored by small boys, also begin. These terms, he holds, may be in part profane expressions, or merely words like *damn* or *hell*. The boy becomes familiar with these words and uses them with satisfaction among his juvenile companions, but "which would never, never do to let his mother, father, or sisters hear." Dunlap stresses the fact that it is the "proper" little boys who become stutterers. "The boy who is 'carefully brought up,' if he is handicapped by a weak constitution" or "erratic muscular activity," is the one that is apt to develop stuttering. He tells us that girls do not stutter because they "do not develop the same fear of revealing a *tabu* vocabulary, although they may have incriminating matter to conceal, and may develop accordingly a hesitating type of stammering."

The treatment recommended by Dunlap is to find out what obscene or objectionable terms the boy might be using, and then tell him that you used to use those words or the equivalents yourself, but have stopped the practice. In discouraging the taste for bad language the "I-would-be-shocked" or the "it-would-break-my-heart" attitude should be avoided. The attitude toward the boy should be "no more contemptuous, crushing, or sniffing than if he should break out with measles."

Basic cause of stuttering. While many theories presented in the past are not tenable in their entirety, they have con-

¹ Dunlap, Knight. "The Stuttering Boy"; in *Journal of Abnormal Psychology*, p. 44 ff. (1917.)

tributed details that have been of value in the analysis and the diagnosis of stuttering. At present, among the most reputable specialists, [stuttering is considered the result of a defect of the nervous system, and not a defect of the peripheral speech organs.] All stutterers show signs of nervousness, but the nervousness is not the cause of stuttering. Nervous instability underlying stuttering causes the nervousness, and likewise causes stuttering. When the nervous instability is eliminated or remedied, the stuttering and the nervousness disappear. Treatment for nervousness rarely removes stuttering, but when the stuttering is corrected, a rapid improvement of the nervous condition follows, for the common cause of both has been remedied.

There are many causes responsible for bringing on a stuttering condition, but no matter what these causes may be, they are but secondary; the primary cause is a condition of nervous instability. Thus, when some factor disturbs the stability of the nervous system, a loss of the automatic control of the mechanism producing speech results. The various speech centers no longer coördinate. Simultaneous recall of memory images in the speech centers is necessary in speech. When these images are not recalled instantly, the mind is thrown into a state of confusion and rational thought ceases. Impressions are sent singly and a composite image is not formed in the mind. Instead of coördinating, several organs work in conflict and a "jamming" results.

In considering the basic cause of stuttering as "nervous instability" rather than "emotional instability" as many authorities do, the source is traced but one step farther. The emotional status and the nervous status of an individual show such close interdependence during the life of an individual that we are often confused as to which is the cause and which is the result. Inasmuch as the nervous system precedes psychic life, and since permanent changes in psychic

life can be effected only through stabilized changes in the nervous system, it seems logical to attribute the *basic cause* of stuttering to nervous instability rather than to emotional instability, and to consider emotional instability an immediate and definite manifestation of existent nervous instability.

Secondary causes. Causes responsible for the disturbance of a nervous system characterized by instability, which in turn may bring on stuttering, may be any of the following:

1. Shock, fright, or psychoneurosis produced by shock or injury.
2. Nervous debility.
3. Imitation — either involuntary, or voluntary as in mockery.
4. Forced change in handedness — not common.
5. Habit, due to:
 - a. Carelessness in childhood.
 - b. Use of words whose meanings and pronunciations are beyond the mental development of the child.
6. Speech conflict. Thinking in one language and trying to speak in another.
7. Faulty motor habits of enunciation and of breathing.

1. *Shock.* The most common secondary cause of stuttering is nervous shock. Practical jokes or terrifying experiences of any sort are often the cause of fright from which the nervous child does not readily recover. Every person is subject to shocks that throw the nervous system out of adjustment and into faulty speech habits, yet every one does not become a stutterer because normally the nervous system is only temporarily or momentarily maladjusted. The defective speech occurring at this time leaves no permanent impression upon the nervous system. Most adults can recall experiences which, for the moment, deprived them completely of speech, or experiences when they could stammer out but a few words. Yet within a few minutes, when the extreme tensivity of the situation was relieved, complete control of the speech mechanism was regained.

However, for a child with a nervous constitution, a con-

stitution which reacts more strongly to every kind of experience than the non-nervous, a terrifying experience may bring on a maladjustment and the resultant stuttering speech may be sufficiently severe to give rise to emotionalism in connection with the stumbling speech. An interesting case¹ has been reported of a child who stuttered as a result of being inadvertently frightened. A man brought home an umbrella of the automatic kind which springs open when a button is pressed. As he began to demonstrate the mechanism to his wife, their excitable little boy happened to enter the room. The sudden springing open of the umbrella gave the boy such a shock that then and there he began to stutter.

Patients stuttering from shock as a rule show a general condition of nervous excitability, overanxiety and are constantly on the alert for possible slights. In extreme cases the patient is psychoneurotic. He is in a state of general anxiety or fear at all times. He readily attaches this fear to any occurrence or thought. He knows that he is over-anxious, but feels that his anxiety is justified for the time being. Shocks of various kinds occurring during childhood, and even in infancy before the child has learned to speak, may be responsible for the general anxiety neurosis.

2. *Nervous debility.* Stuttering may appear during a debilitating illness. When a child is suffering from a serious illness he may not have sufficient energy properly to control the mechanism of speech, and while convalescing may be too weak to throw off stumbling speech habits. As the faulty speech habits continue he may lose the mastery of his speech. The condition of exhaustion is often the aftermath of some children's diseases, such as whooping cough, influenza, measles, scarlet fever, rickets, or any illness accompanied with fever.

¹ Greene, *op. cit.*, p. 74.

3. *Imitation.* Often stuttering is a result of imitation. This may at first be either intentional or unintentional. Children in playful mimicry or in mockery may imitate a stutterer, and may then find that they are not able to stop the habit. This practice of stuttering is dangerous because faulty memory-images thus formed are fixed; it is an especially dangerous practice for the nervous child. A child that stutters is a menace to his playmates, for the playmates are forced to receive faulty auditory imagery. A stuttering parent often has a stuttering child, and when a child in a family stutters it is common that other children in the family will also stutter. When children are young the habit becomes fixed more readily, for the child has not yet had opportunity to establish definite speech imagery. When a stuttering parent has a stuttering child, the stuttering habit is not, of course, inherited, but the nervous constitution underlying the difficulty is inherited. This inherited nervous constitution succumbs more readily to the stuttering habit than does the normal constitution.

4. *Forced change in handedness.* Changing the handedness of a child — that is, requiring a left-handed child to write with his right hand, or *vice versa* — has been thought to be a common cause for stuttering. In fact, some schools for stutterers considered this so common a cause that, before making a thorough diagnosis, they proceeded to change the handedness of the subject. Right-handed stutterers were required to write with the left hand, and left-handed stutterers were required to write with the right hand. Since stuttering accompanied whichever hand the subject had been using in writing, it was thought that that hand was not the one designated for use by the individual's nervous system. It is of interest to note, too, that many schools claimed cures through this simple procedure. However, a great deal of data is now available showing that a change

in handedness is not often followed by stuttering. The explanation of stuttering after a change in handedness is based upon the fact that the coördination of the language centers of the brain is disturbed. In a left-handed individual the language centers are in the right hemisphere of the

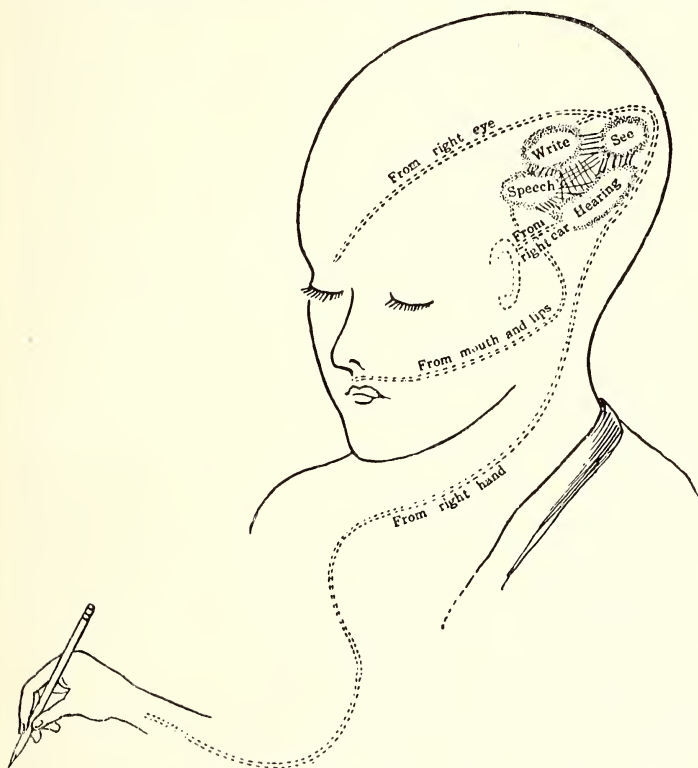


FIG. 18. THE BRAIN CENTERS OF SPEECH, READING, AND WRITING

Diagram to show the position of the four cerebral centers that have to do with the reception, the production, and the storing up of memories of speech, reading, and writing. Note the association fibers joining up the four centers, each with the other three. This is an explanatory diagram only, and is not meant to be a scientific anatomical representation of the actual receptive areas in the brain; the system is far too complicated for any such representation. (*Adapted from Lapage.*)

brain, which controls the left side of the body. Requiring the left-handed individual to use his right hand interferes with the coördination of the language centers, and affects the centers for spoken language.

The point that must be stressed in the cases where a forced change in handedness has been followed by stuttering is that an emotional disturbance, accompanying the forced change, was responsible for the faulty speech in individuals of nervous constitutions. Could the change in handedness be brought about without terrifying (to the nervous child a situation may be terrifying that to a non-nervous child is but temporarily tense or strained) conditions, no speech defect would manifest itself. Moreover, in the non-nervous child, even though drastic methods are employed in effecting a change in handedness, stuttering does not result. Each hand can be trained to perform a great variety of intricate and skillful acts without jeopardizing the integration of the language-center functions. Learning to play the piano, to finger the violin, mandolin, and various other musical instruments, to operate the typewriter — all require skillful activity of the left hand. In no case while the left hand is acquiring the skillful habits has there been a speech disturbance in the normal individual. Should drastic methods be used in establishing a change in handedness so that strong emotionalism is produced in the child, the emotionalism, not the activity of the left hand, may disturb the nervous stability of a child and produce stuttering.

5. *Carelessness.* A habit of stuttering can be formed even though there has been no example of the defect before the child. Careless habits of thinking and of speech, in which the child repeats words or enunciates in a slovenly way, are sufficient to establish the habit. A child using words difficult to pronounce and beyond his mental development in meaning, cases in which he does not have strong confidence

in his ability to pronounce correctly, cause a stumbling over the pronunciations and may create a fear of certain words. This stumbling pronunciation, uncertainty, and fear may establish a stuttering habit in the nervous child.

6. *Speech conflict.* A speech conflict, often manifested in stuttering, has occasionally been found in children who speak one language at home and another in school. This is due to the inhibition placed upon the motor language center when the child hesitates to use a word in the foreign tongue that crowds for expression when no English word can be thought of. It must be added that this condition is more prevalent with mentally dull and physically nervous children than with mentally and physically normal children. Superior children often acquire three, four, or five languages without showing any signs of speech conflicts.

7. *Faulty motor habits of enunciation and of breathing.* Some children, because of ignorance in regard to the production of consonant sounds, try to produce these sounds with vocal organs out of position. For instance, trying to produce the consonant sound *l* or *m* with an open mouth results in a conflict of auditory and motor functions. The confusion following may encourage stuttering.

Some stutterers open their mouths wide and produce an *a-a-a-* sound before they can say a word. Some are suddenly unable to speak right in the midst of something they want to say, or before they speak at all.

Age of onset. In regard to the age of onset of stuttering, Wallin¹ found that, in the case of 432 individuals, 81.4 per cent began to stutter before the age of six; in many of these cases an indefinite point in early life was specified. Fifteen per cent began to stutter between the ages of six and ten, and 3.4 per cent after the age of ten.

Prevalence. The prevalence of stuttering is variously

¹ *Report of the Board of Education of the City of St. Louis, 1915-16, p. 187.*

estimated primarily, perhaps, because investigators are not agreed upon the diagnosis of the condition of stuttering. Conradi,¹ on a basis of a survey of 87,440 school children, found an incidence of .87 per cent of stutterers. McDowell² also found .87 per cent of stutterers in a school population of 7138. Scripture³ states that "statistics show from 1 to 2 per cent of stutterers among school children. A smaller percentage in the lower classes becomes trebled in the higher ones. Marked increases are found at the periods of second dentition and puberty." Root⁴ found stuttering and stammering to occur in 1.2 per cent of school children. Wallin⁵ gives .7 per cent as his estimate of the prevalence of this difficulty, while Blanton⁶ found .72 per cent of the school population afflicted. Wallin⁷ quotes various European investigators in regard to findings in other countries. One Danish investigator found .61 per cent of Danish children stuttered, while another found .9 per cent of Danish country children and .74 per cent of Danish city children to be stutterers. On the basis of a school population of 231,000 children in the towns of Hungary, 1.02 per cent were reported stutterers. In Belgium the prevalence of stutterers among 14,235 school children was found to be 1.4 per cent. Wallin

¹ Conradi, E. "Speech Development in the Child"; in *Pedagogical Seminary*, vol. 11, p. 365.

² McDowell, E. D. *Educational and Emotional Adjustments of Stuttering Children*, Columbia University, New York, 1928. Contributions to Education, no. 314, p. 6.

³ Scripture, E. W. *Stuttering and Lispings*, p. 9. The Macmillan Company, 1923 edition.

⁴ Root, A. R. "A Survey of Speech Defectives in the Public Elementary Schools of South Dakota"; in *Elementary School Journal*, vol. 26, p. 533.

⁵ Wallin, J. E. W. "A Census of Speech Defects"; in *School and Society*, vol. 3, p. 219. (February 5, 1916.)

⁶ Blanton, Smiley. "A Survey of Speech Defects"; in *Journal of Educational Psychology*, vol. 7, p. 583. (December, 1916.)

⁷ Wallin, J. E. W., *op. cit.*, p. 214.

gives the average of seven of these surveys as .9 per cent, with extremes ranging from a little over .5 per cent to about 1.5 per cent.

Sex. In all studies stuttering has been found to occur far more commonly among boys than among girls. One investigator, Bluemel,¹ gives the excess of boys over girls to be as high as 4 or 5 to 1. Wallin,² 2.8 to 1; Root,³ 2.2 to 1; Conradi,⁴ 3 to 1; McDowell,⁵ 2.9 to 1; Blanton,⁶ 3 to 1.

Intelligence of the stutterer. The most intensive investigation of the mental aspects of the stutterer was carried on by McDowell, a few years ago. Out of a total of 7138 public school children in seven schools of New York City, 62 were found to show stuttering cramps in varying degrees of severity. Sixty-one of these children were given the Stanford Revision of the Binet Intelligence Test. These stutterers were found to have intelligence quotients ranging from 63 to 156. The mean of the distribution fell at 99.14 with a value of 20.3 for the standard deviation. Thus the group fell within one point of the standardized average, with approximately 68 per cent of the group lying within twenty points each side of that point. According to the norms of the Stanford Revision, the group of stutterers was found to be practically typical. Investigations of the patronage of the seven schools in regard to nationality and occupation of parents showed the children studied to be reasonably representative of school children in general. It was, therefore, concluded that stuttering children showed up as well as any other random sampling on an intelligence scale largely weighted with language tests.

¹ Bluemel, C. S. *Stammering and Cognate Defects of Speech*, vol. 1, p. 210. G. E. Stechert, New York, 1913.

² Wallin, *op. cit.*, p. 215.

³ Root, *op. cit.*, p. 537.

⁴ Conradi, *op. cit.*, p. 365.

⁵ McDowell, *op. cit.*, p. 7.

⁶ Blanton, *op. cit.*, p. 584.

Ratings on language and non-language intelligence tests.

In an experiment, 50 stutterers were equated with 50 non-stutterers as controls, so that intelligence quotients, nationality, and occupation of parents were comparable, and the Pintner-Paterson Shorter Performance Scale was given to both groups. On this test the difference between the two groups was so small that the experimenter did not consider it a real difference.

Two Binet tests dealing largely with language ability, the Free Association Test at the ten-year level, and the Vocabulary Test were selected for special comparison of the two groups. Comparisons again were negative. In the association test the subject is asked to name as many words as he can think of within three minutes. In spite of the stutterers' blockage in enunciation, they showed a mean of 69.1665 words in comparison with 69.7220 words for the control mean. In the vocabulary test the stutterers had a mean score of 31.2448, in comparison with the control mean of 30.551. The difference again is negligible.

School achievement. It has been claimed that speech defects, especially stuttering, have affected school achievement. One investigator¹ claimed that when measured according to overageness speech defectives who remain in school are on the average six months older or six months behind the average pupils without disorders of speech, and in terms of school progress the retardation is still greater. That is, the stutterers progress through school less rapidly. The estimates, however, are not based on standardized-test findings. The McDowell investigation, basing school achievement on standardized achievement test findings of equated groups of stutterers and non-stutterers found no appreciable differences between the stutterer and the non-stutterer in regard to school achievement.

¹ Root, *op. cit.*, p. 256.

Emotional and social adjustments. Since the emotional status of the stutterer is so closely involved with his speech disorder, findings in regard to his emotional and social adjustments are of great importance. The McDowell¹ study made three attempts to compare stutterers with non-stutterers in these respects. Each child of the experimental and of the control groups was given (1) a combination of the Woodworth-Mathews and the Woodworth-Cady questionnaire for identifying individuals with psychotic tendencies, (2) the Kent-Rosanoff Free Association Test, and (3) a teacher's rating on the basis of the trait inventory used by Terman² in his study of gifted children.

In the first test the experimenter interviewed each child, using all but one ("Do you feel that your parents are not really your own?") of the questions of both questionnaires as a basis. A few additional questions were included, as, for example:

"Do you ever imagine people are talking about you behind your back?"

"What do you imagine they say?"

"Does it bother you very much?"

"Have you ever been so angry with a person that you thought you would never forgive him?"

"What did you do about it?"

The mean of the responses indicative of "psychotic" conditions fell at 22.6522, with a standard deviation of 9.616 for the stutterers; for the control group the mean was 20.1304, with a standard deviation of 9.9532. These results showed less than half certainty that the tests showed a real difference between the two groups of children.

An analysis of the differences on the various questions was

¹ McDowell, *op. cit.*, chap. v.

² Terman, L. M. *Genetic Studies of Genius*, vol. 1, p. 523. Stanford University Press, 1925.

not able to discover indication of any bias on the part of either group. The only difference for specific responses seemed to be in regard to the question as to whether they "get out of breath quickly when they run." Stutterers admitted that they did more often than did non-stutterers.

In using the Kent-Rosanoff Free Association Test, additional "key" words, suggestive of alleged emotional undercurrents in stutterers' reactions, were interspersed. The "key" words were chosen because of popular opinions "that stuttering is a maladjustment due to shame, lack of social graces, an exaggerated desire to appear well in public, too much hurrying, 'suppressed erotic desires,' fears of every sort, browbeating on the part of those in authority, and similar disturbance." These "key" words were: *unpopular, shame, speech, stammer, pet, love, hate, sweetheart, ill-mannered, afraid, punish, mad, cry-baby, polite, slow-poke, stutter, bossy, lie, disgrace, hurry.*

The children's reaction times in responding to stimulus words were taken to fifths of a second, and the responses were scored according to the table of frequencies given in Rosanoff's *Manual of Psychiatry*. The reaction times for each child were then thrown into a distribution, the mid-score and the limits of the upper quartile were determined. All words falling below the normal curve of distribution were tabulated and inspected for any distinguishing habits between the two groups.

Comparisons of the two groups were then made on the bases of the mid-scores, upper quartile points, excessive reaction times on particular words, and on the reaction times for the "key" words. All differences were negligible.

All words having reaction times of eight seconds or more were then considered individually, and compared for frequency of the occurrence of the prolonged pause before responses. Examination of the differences between the num-

ber of times each word fell into the excessively long reaction group revealed a difference between the stutterers and the controls in only four cases, namely, to the stimulus words, *hand*, *rough*, *afraid*, and *long*. In these cases the stutterers delayed responses significantly longer than the control.

Conclusions for this portion of the study were that, in spite of the habitual hesitation in speech, stutterers show little difference in their responses from those of non-stutterers, except in the case of excessively long reaction times.

A qualitative study of the Kent-Rosanoff responses failed to reveal any traits distinctive of stuttering children's emotional adaptations.

In regard to the reaction times of "key" words, no appreciable difference between stutterers and non-stutterers were disclosed.

Trait ratings. A trait rating from a teacher was then obtained for each stutterer and for each control child. The traits rated were those selected by Terman in his study of gifted children, namely: (1) health; (2) amount of physical energy; (3) prudence and forethought; (4) self-confidence; (5) will-power and perseverance; (6) musical appreciation; (7) appreciation of beauty; (8) sense of humor; (9) cheerfulness and optimism; (10) permanency of moods; (11) fondness for large groups; (12) leadership; (13) popularity with other children; (14) sensitiveness to approval or disapproval; (15) desire to excel; (16) freedom from vanity and egotism; (17) sympathy and tenderness; (18) generosity and unselfishness; (19) conscientiousness; (20) truthfulness; (21) mechanical ingenuity; (22) desire to know; (23) originality; (24) common sense, and (25) general intelligence.

On a graded scale each teacher was asked to estimate the degree of each trait possessed by the child. Although the number of judgments was small, the data were at least suggestive of marked similarity of stuttering and non-stuttering children in these traits.

Physical condition of stutterers. The only available study of the physical condition of stutterers, in comparison with comparable non-stutterers, is included in the McDowell¹ investigation. Thirty-eight pairs of children were examined in regard to various physical traits, with especial attention given to the physical organs used in speaking.

1. *Breathing.* Measurements of lung capacity, chest girth (inspiration and expiration), and general condition of the lungs were made. The findings showed no real differences in any of these traits.

2. *Hearing.* The whisper and the watch test were used to test hearing, with the conclusion that poor hearing probably was not a factor in the stuttering speech of the children tested.

3. *Mouth, tongue, and teeth.* The percentage of malocclusion of the mouth was high in each group, but the difference between the two groups did not indicate a real difference in this respect. In such other traits as tongue-tie, coated tongue, and general condition of the teeth there were no substantial differences.

4. *Nose and throat.* Tonsils, cervical glands, and thyroid glands were examined, but no distinctive differences were found between stutterers and non-stutterers.

5. *Vision.* Vision was studied and recorded on the Snellen charts. There was no indication that stutterers are different from non-stutterers in accuracy of vision.

6. *Strength of grip.* Tests of the strength of grip in the right hand and in the left hand gave the following interesting comparisons:

	Stutterers	Controls
Equal strength in both hands	16 per cent	24 per cent
Right hand stronger than left	61 per cent	63 per cent
Left hand stronger than right	24 per cent	14 per cent

¹ McDowell, *op. cit.*, chap. vi.

In order to determine the reality of the difference, the investigator treated statistically the percentages in the case of the largest difference, that of 10 per cent more stutterers having more strength in the left hand. The experimental coefficient was found to be .63, where 1. would indicate certainty of a real difference.

Thus there was no indication of a difference between these groups.

7. *Posture.* Rated on a five-place rating scale for posture, the two groups of children show no appreciable differences. A detailed analysis of the specific deviations from normal posture failed to reveal differences in regard to shoulders, abdomen, spine, chest, or feet.

8. *General health.* Each of the examiners gave a judgment on the apparent general health conditions and nervous state of the subject. No differences between stutterers and non-stutterers were found. 29 per cent of the stutterers and 26 per cent of the non-stutterers were judged to be nervous.

9. *Weight, height, and nutrition-weight.* No differences were found between the weights and the heights of the two groups. Nor was there a difference in the nutrition-weights when equated in chronological and mental age and racial inheritance.

10. *Heart rate and blood pressure.* There was no difference large enough to assume that a real difference existed between the two groups.

Corrective procedure for stuttering. Since there are many distinct causes for initiating an emotionalism that disturbs nervous stability, which in turn causes stuttering, a single blanket remedial procedure cannot be outlined. The diagnosis of each case must be made with the knowledge that the nervous instability has been agitated by emotionalism. This emotionalism is but a manifestation or result of nervous instability, and remedial work must be directed

against nervous instability. Each case of stuttering demands special treatment according to its etiology and pathogenesis. Statistical findings cannot determine the remedial work for an individual case. Treatment must be directed against removal of all physical disabilities and all psychic inhibitions which may directly or indirectly affect the speech mechanism. A cure usually demands the coöperation of the psychologist, the physician, and the social worker. After the basic causes have been remedied or removed and a confidence established in the patient, it is necessary to reëducate the cortical speech centers. Correct auditory-verbal, motor-verbal, visual-verbal images of troublesome speech sounds must then be established. The whole mental attitude of the stutterer must be reorganized.

The stutterer is often introspective, extremely self-conscious, lacks confidence in his ability to speak, and often indulges in self-pity. A facial expression typical of the profoundest sadness may be acquired by the stutterer. In extreme cases the patient is psychoneurotic, and is in a state of general anxiety or fear at all times. Because of these mental traits remedial work must be conducted under very patient and sympathetic guidance. Constant encouragement and optimism must be supplied for the subject.

Stuttering and left-handedness. A relationship between stuttering and left-handedness, or following a reversal of handedness in writing, has been a popular conception in recent years. One investigator ¹ claimed that one in every six stutterers is left-handed. Wallin ² reported that of 1844 children out of a total of 89,057 school children who, though left-handed, had been taught to write with the right hand, only 9.4 per cent had acquired any speech defects and

¹ Ballard, P. B. "Sinistrality and Speech"; in *Journal of Experimental Pedagogy*, vol. 1, p. 309.

² Wallin, *op. cit.*, p. 215.

many had acquired the defects before they had been taught to write at all. Oates¹ claimed that speech defects are six times more frequent among children of mixed handedness than among children of pure handedness and that "crossing" handedness definitely increases the tendency to speech defect.

None of these studies, however, has taken all significant factors into account. An investigation into the emotional stability of the subjects studied and the methods used in training the nonpreferred or the left hand are of greater importance in studying the relationship between stuttering and left-handedness than most investigators realize. In the last named study, even the method of determining handedness was not entirely satisfactory. The following

¹ Oates, D. W. "Left-handedness in Relation to Speech Defects, Intelligence and Achievement"; *The Forum of Education*, vol. 7, pp. 91-105. (1929.)

Oates's contribution is an extensive, but not an intensive study. While his conclusions sound reasonable they cannot be based upon his findings. His method of determining handedness in uni-manual activities was based upon three (three of three? or two of three?) tests, writing, hammering and throwing. Writing is subject largely to training and the other two tests are not absolute tests. Handedness of bi-manual activities was based upon batting and sweeping tests — neither an absolute test and since Rife's method of scoring was followed, the majority of Oates's right-handed subjects would score left-handed on the sweeping test.

Other factors in Oates's work, such as classifying his subjects in regard to intelligence on the basis of teachers' judgments (which he admits can only be drawn roughly since "in spite of efforts to keep the judgments as uniform as possible there are inevitable differences in the distribution of the categories from school to school") and careless composition make one hesitate to value this study too highly.

Oates found only 5 per cent of his subjects to be left-handed — this small number in a total of 39,500 *boys* might indicate that he discovered only the more extremely left-handed. No distinctions were made between types of speech defects studied nor were allowances made for the number of speech defects to be found among any group of unselected boys. If minor speech defects were included in the study, and that is probably what was done, a very high percentage of speech defects was studied in the case of a few and extremely left-handed boys.

case may be cited as illustrating factors often overlooked.

A left-handed adult recently reported that when he was a child his teacher threatened to burn his left hand on a stove, so that he would be compelled to use his right hand for writing. He soon began to stutter even though the threat was never carried out, and his handedness was not changed. His fear and dislike of his teacher were so great that his parents sent him to another school, and his stuttering ceased in a very short time.

Another case, that of a four-year-old boy, left-handed and stuttering, was recently referred to the writer. The child's father had begun to train the child to use his right hand for holding his fork or spoon while eating, and the child quite suddenly began to stutter in his speech. The child soon showed great restlessness, and began to talk and scream during sleep. The child showed no especial difficulty or dislike in eating with his right hand, and it was hardly thought possible that the limited activity of the left hand could be responsible for the nervousness and stuttering showed by the child. An investigation found that the child, left alone during the greater part of the day, had made the acquaintance of a group of boys and was spending a great deal of time with them. Sex play and play with matches, both of which had been forbidden him, were common. The greatest secrecy was maintained, and threats were made against any one who might "tell" on the group. When the child's play habits were discovered and properly supervised, his nervousness and the stuttering disappeared about as quickly as they had begun. He was allowed to continue with right-handed eating habits. In this case we could say that either the stuttering was due to a reversal of handedness in eating habits and disappeared when the changed handedness was established, or that it was due to the nervous tension in-

duced by the child's mental state of fear and guilt and disappeared when the nervous tension was relieved. It would hardly seem possible that the limited activity of the left hand could cause the nervous strain experienced by the child, yet a casual observer would link the two conditions.

Until further and more intensive investigations are made it is, perhaps, safe to say that a reversal of handedness (as well as the training of the preferred hand) indirectly may cause speech defects in individuals of emotional instability, when antagonizing or irritating methods are used.

Some investigators have successfully used hypnosis in suggesting self-confidence and encouragement. Neural inhibitions can readily be removed under hypnosis, and in some cases suggestions for post-hypnotic removal of speech inhibitions have been successful.

Hawthorne¹ reported an interesting case of a college student who stuttered in his speech and also stuttered in his writing, that is, a cramping and an inhibition of the muscles used in writing resulted in jerky movements punctuated by pauses. In an experiment the subject was timed while writing the following passage:

"Listen, my children, and you shall hear
Of the midnight ride of Paul Revere."

In a waking state the subject required fifty seconds to write the passage, but when under hypnosis he was able to write the same passage with smoother movements in only thirty-five seconds. This example illustrates the tenseness, not only of the stutterer's speech mechanism, but of his whole system. The finer muscular adjustments necessary in speech and writing naturally show greater disturbances than the gross body adjustments involving larger muscles.

¹ Acknowledgments are made to Joseph Hawthorne, of the Psychology Department of Pomona College, for the report of this case.

Fletcher¹ advocates environmental and educational therapy in the case of stuttering. He proposes that rooms or buildings, equipped with necessary paraphernalia for the successful teaching of all subjects should be set aside for stutterers and for others who need similar care. All suggestions of abnormality should be avoided in this environment and the stutterer should get the general impression that the place is an interesting and stimulating one in which it will be possible for him to do what he is expected to do without paying a penalty for it. This environment should be such that the afflicted child will be able to learn and to do things without the constant and harassing fear of being called upon to participate in recitation or activities devised for children of fluent speech.

Fletcher points out that in this new situation the stuttering child may be required to do things which under other conditions are (1) impossible for him to do without punishment, (2) which are of themselves worth doing, and (3) which are curative in their effect upon his speech difficulty. The solution of the problem of stuttering is thus placed in the educator's, not the physician's hands. The stutterer's curriculum is of secondary importance. The establishment of new habits and healthier social attitudes is of major importance. The ability to make social adjustments is the stutterer's goal, in Fletcher's plan. Motor training in speech habits, through singing, dramatization, and speaking, are recommended.

Non-consequential factors. All stutterers can sing at all times. This may be due to the fact that singing is easier than speech, because one is simply repeating another's thoughts. As a rule one learns to sing in concert, there is no accompanying emotional strain through mental and physical

¹ Fletcher, J. M. *The Problem of Stuttering*. Longmans, Green, and Company, 1928.

coördination. The acquired confidence is retained. Likewise, most stutterers are able to read poetry without stuttering.

The stutterer often resorts to artifice in order to avoid speech blockage. If asked whether he has had lunch, a stutterer may want to say "No," then suddenly remembering "I cannot say 'No,' answers 'Yes.'" One stutterer gave the following account of how he lost his position: It was his duty to answer the telephone in an outer office, and one day some one asked whether the employer was in. "No, the boss is not in," he answered, although looking directly at the employer through the doorway of the inner office. The employer asked why the boy replied as he did. The boy explained that he couldn't say "Yes," and feeling that he must say something he said "No."

One investigator¹ claims that every stutterer indulges more or less in prevarication of this type without any intention or desire to be dishonest, and cites the case of a college student who smoked Omar cigarettes. Whenever he was about to ask for them, his negative reaction at the moment would be so great that he would say, "Give me a package of O—O—O—Lucky Strike." The student confided that after saying "Oh," he always felt that the "mar" would never come out, so that he had to say something else. "Lucky Strike" seemed easy, but he confessed that he "always deplored the fact that throughout his college life he was compelled to smoke the wrong brand of cigarettes."

2. *Lisping*

Lisping is a term commonly used to denote various forms of speech defects. In its broad sense, it is the faulty production of sibilant (*s*, *z*, *sh*, and *zh*) sounds, although occasionally cases of lisping on other sounds (*t*, *l*, *n*, and *d*) are en-

¹ Greene, *op. cit.*, p. 82.

countered. Lispering on sibilant sounds is of two distinct types: infantile lispering and lateral lispering.

Infantile lispering. The infantile lisper protrudes the tongue between the teeth in the production of various sounds. He lacks control of the tongue muscles and a sluggish action of the tongue results. In trying to say, *She says some simple things*, the infantile lisper says *Thee thays thome thimple things*. In some cases the tongue is suspended just back of the teeth instead of being protruded, and a soft sound of *s* replaces the sibilant sound. This form of lispering often occurs when the child loses the front teeth during the period of second dentition. The tongue slips out through the opening left by the loss of teeth, and the *th* sound replaces the *s* sound. Although in the majority of cases this speech defect is removed after the second dentition, in some cases the lispering habit continues.

Corrective work must be directed at strengthening the muscles of the tongue so that the child will have automatic control of them. Tongue exercises must be given, and the correct positions for *s*, *z*, *sh*, *zh* must be taught. Correct visual and auditory imagery of the desired sounds must be presented to the child. The teacher can use a toothpick to hold down the tip of the tongue so that the child can form correct motor habits. Drill on the formation of auditory and visual imagery and the motor habits must be repeated many times, until they are well established. Exercises in combining the sibilant sounds with vowel sounds should then be given. These exercises would consist of such sound combinations as *sah*, *sa*, *see*, *soy*, *soo*, *su*, etc. The child should be required to open his mouth as wide as possible when giving the vowel sound following the sibilant sound. When the child has learned to produce the various sounds correctly he should be required to use them first in words, then in simple sentences, and later in conversation.

Lateral lisp. When the sibilant sounds are emitted over one or both sides of the tongue, lispings results that is called *lateral lispings*. In many cases malocclusion is the cause of this side emission of sibilant sounds. The upper and lower teeth meet in front but not at the sides. The aperture at the sides permits the air to egress laterally when sibilant sounds are made.

Another cause, although not so common, is the falling of the soft palate to one side of the mouth. This causes the current of air from the larynx to be driven out from one side of the mouth, instead of over the center of the tongue. The back of the tongue flattens in cases of falling soft palate and the front part rises. This causes an opening from the posterior side of the tongue not opening over the tip of the tongue. The side emission of the sibilant sounds results. Although this defect is a great handicap, it is not as serious as it sounds and can be corrected quite readily. As in infantile lispings, the general procedure to follow for remedial work is to create a desire for correct speech sounds, formation of correct auditory and visual imagery by demonstration before the child, establishing correct motor control, and the formation of automatic and unconscious control of lingual muscles by exercises and drills until the defect disappears entirely.

Other causes for lispings. Certain physical defects may be the cause of lispings, as:

1. *Tongue-tie.* When the frenum of the tongue is too short the tongue is not able to rise sufficiently in front to cut off the air except what passes

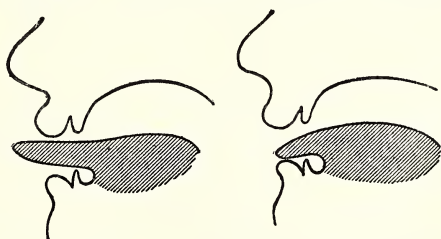


FIG. 19. NORMAL AND TONGUE-TIED TONGUES

1. Average reach of normal tongue.

2. Average reach of tied tongue.

through a small channel to make the *s* sound. The sound produced is more like *th*. A person must be able to project the tip of the tongue beyond the teeth for correct speech. To relieve lisping due to tongue-tie, it is necessary to have a physician cut the frenum slightly, and then the teacher can correct the lisping by training for correct motor habits. Tongue-tie, as some people formerly thought, does not cause stuttering. It can do so indirectly when it makes an individual so nervous that his nervousness causes stuttering.

2. *Harelip*. Lisping from harelip can be remedied only



FIG. 20. SINGLE AND DOUBLE HARELIP

1. Single harelip. 2. Double harelip.

by surgery. After the lip has been corrected, careful training in the production of correct speech sounds is essential.

3. *Jaw and tooth defects*. In most cases overshoot and undershot jaws are due to irregular development of the teeth. In some cases the projection of the jaw may be so great that the lips are not able to close properly for *b, f, p, m, v*, and several of the vowel sounds. With a strongly undershot jaw the *s* is produced as the tongue moves to its position to make a *t*. *Take* is pronounced as *steak*. In cases when the upper front teeth project much beyond the lower teeth it is often difficult to adjust the tongue so that the jet of air strikes the lower teeth correctly for *s*. *Sh* is sounded instead.

Gaps left by extracted teeth often make it difficult to pronounce *s*, a difficulty usually remedied only by the insertion of an artificial tooth. Misplaced teeth often interfere with the tongue in making correct sounds, especially the *t* sound. Badly obtruded or intruded front teeth often cause lisping.

Most jaw and tooth defects can be corrected only by an

experienced orthodontist. In children under sixteen this can be done readily, and in most cases even when the individual is some past twenty. Older cases are usually hopeless.

4. *High palatal arch.* A high palatal arch affects the *s* sound primarily. The individual has difficulty in getting the tongue properly against the palate to produce the small channel necessary for the sound. In children this condition can be corrected by means of forced spreading. In adults

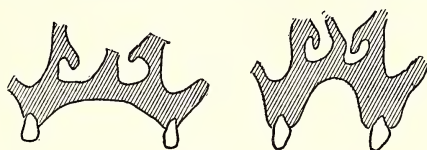


FIG. 21. NORMAL AND HIGH PALATAL ARCH

1. Normal palatal arch. 2. High palatal arch.

High palatal arch is commonly associated with adenoids of long standing.

very little can be done for this condition except to teach the subject how to compensate for it by increased lingual activity.

Neurotic lisps. If the correction of lisping is neglected, some children may become very nervous about their abnormal speech and develop into neurotic lisps. The seriousness of this can readily be seen. In regard to the diagnosis and treatment of neurotic lisping, Scripture¹ says that neurotic lisping in its causation (fright, nervous strain) is allied to stuttering and is indicative of emotional disturbance. It differs from stuttering in being accompanied by excessive muscular tension more or less constantly rather than spasmodically so that a speech similar to lisping and not to stuttering results. This type of lisping differs from negligent lisping in that its muscular movements are cramp-like instead of careless and it makes its appearance in nervous individuals rather than in phlegmatic or dull ones.

¹ Scripture, E. W. *Stuttering, Lisping and Correction of the Speech of the Deaf*, p. 185. The Macmillan Company, 1923.

Treatment. In general, the treatment often prescribed for neurotic lisping is mainly that for neurasthenia. General physical conditions, moral habits, mode of life, nervous stability, and emotional status of the individual are considered.

The specific speech treatment usually consists in explaining the trouble to the patient, and then having him repeat sentences and carry on conversation in a relaxed way.

Statistical findings in relation to all types of lisping. Lispings, as was previously stated,¹ has been found to occur in 1.6 per cent of the total school population of St. Louis. This was more than twice the number of stutterers found in the same school. A preponderance of mild over severe lispers was also disclosed in the survey findings. The ratio of mild to severe cases of lisping was reported to be 78.7 to 21.1. One and nine tenths per cent of all the boys enrolled were found to lisp, as against 1.3 per cent of all the girls enrolled. In regard to the severity of lisping there seemed to be no significant sex difference.

CASE STUDIES

1. *A Stutterer*

The case. Harlowe is twelve years of age, and has an I.Q. of 88. He stutters very much when he tries to talk. Neither his father nor his mother nor any one of his playmates stutters. Harlowe's defective speech became evident shortly after he began to talk. His mother has never permitted any one to ridicule her son's speech, and has tried to help the boy by having him speak very slowly, or stopping entirely for a while. When called upon to recite in the classroom the boy becomes so nervous that he finds it impossible to utter a single syllable. The teachers are usually considerate, and do not ask the boy to take part in discussion. Harlowe's fifth-grade teacher volunteered to try to correct the boy's speech, and helped him two or three nights every week for a year. She required the child first to sing a statement, then to repeat the statement with gradually decreasing amount of music

¹ See Wallin, *op. cit.*, pp. 126-29.

until he gave a monotonous sing-song rendition of it. The day following the learning of statements in this manner, Harlowe was required to make the statements during class discussions. While speaking in the sing-song manner, Harlowe was told to "hear" himself singing the statement. The teacher's purpose was to give Harlowe confidence before the group, and to utilize the fact that stutterers are able to sing. Harlowe was always able to make the statements learned and was delighted with his success before the class group, but he was never able to think of original statements and subject them to the same procedure without practice, a step toward which the teacher directed all her work.

Harlowe plans to stop school as soon as the law will permit him to do so. The family is in very straitened circumstances, and already require Harlowe to help support himself.

Queries. Is it worth a teacher's time to try to correct Harlowe's speech when he is not interested, nor able to stay in school long? How would you proceed with this case? If Harlowe's I.Q. were higher, would you be more willing to try to effect a cure for his stuttering?

2. *A Lisp*

The case. Mrs. W. about fifty-five years of age is a socially prominent woman. She has a loud, clear, and pleasant voice. She is active in civic club work, and often introduces lecturers or entertainers in a very large city auditorium. In conversation about defective speech Mrs. S. told the writer that, as a child, she had a very pronounced lisp. Her parents, she said, sent her to a private school for corrective speech work two or three times per week during one year. She learned to speak not only without lisping, but with the clear enunciation and articulation we admire so much. She repeated many tongue twisters that she had learned, "Peter Piper," "The Thistle Sifter," etc., and said that sometimes now, almost fifty years after being cured of her lisping, she found that she would often begin to lisp when she was completely exhausted.

Several weeks after this conversation she told the incidents of her husband's tragic death. She tried very hard to retain her composure, but became emotionally disturbed, and when on the verge of tears she began to speak with a very extreme *th* lisp. She stopped speaking for a moment, the subject of conversation was

changed, Mrs. W. regained her composure, and then spoke with her customary clearness of speech.

Queries. Mrs. W. does not know the cause of her lisping; the cure was based entirely upon training in hearing correct speech, and practice in repeating difficult letter sounds. How would you explain her lisping during emotional disturbance? Could any training succeed in preventing a reversal to faulty speech habits of childhood during extreme fatigue or emotional disturbance?

SELECTED REFERENCES

1. Anderson, L. O. "A Preliminary Report of an Experimental Analysis of Stuttering"; in *Journal of Applied Psychology*, vol. 5, p. 340. (1921.)
2. Ballard, P. B. "Sinistrality and Speech"; in *Journal of Experimental Pedagogy*, vol. 1, p. 298.
3. Bluemel, C. S. *Stammering and Cognate Defects of Speech*, vol. 1. G. E. Stechert, New York, 1913.
4. Borden, R. C., and Busse, A. C. *Speech Correction*. F. S. Crofts, New York, 1925.
5. Coriat, I. H. "Stammering as a Psychoneurosis"; in *Journal of Abnormal Psychology*, vol. 9, p. 417 ff. (1914.)
6. Creasy, H. M. "Psychopathology of Speech Defects"; in *Quarterly Journal of Speech Education*, vol. 5, p. 266.
7. Dunlap, Knight. "The Stuttering Boy"; in *Journal of Abnormal Psychology*, vol. 12, pp. 44-48. (1917.)
8. Fletcher, J. M. "An Experimental Study of Stuttering"; in *American Journal of Psychology*, vol. 25, pp. 201-55. (April 1914.)
9. Hedrick, J. "Unique Speech Clinic"; in *Quarterly Journal of Speech Education*, vol. 8, p. 161.
10. Scripture, E. W. *Stuttering and Lispings*. The Macmillan Company, 1923.
11. Stinchfield, S. M. *A Preliminary Study in Corrective Speech*. University of Iowa Studies, 1920.
12. Wallin, J. E. W. "Theories of Stuttering"; in *Journal of Applied Psychology*, pp. 349-67. (1917.)

CHAPTER IV

MINOR SPEECH DISORDERS

1. *Baby talk*

Infantile perseveration (baby talk). This disorder is usually the result of faulty interpretation and production of sounds. Mental or physical defects accompanying baby talk are rare. Doting parents are usually responsible for presenting faulty auditory imagery and encouraging the child to make faulty motor habits. Young children universally and quite naturally express themselves in imperfect speech. Characteristic expressions of baby talk persisting beyond the years of infancy (one to six) must be considered as speech defects, and classified under the general heading of defects of infantile perseveration. Only very young children should be permitted to say "titty tat," "twolley tars," etc., and no child, even very young ones, should hear the "Does oo lub ooze muvver" regularly. Care should be taken to use good speech with the child long before he even begins to speak, for internal speech impressions or images are formed months before motor speech begins.

In general, parents consider baby talk "cute" and permit the child to use it, thinking that by the time he reaches six or seven years he will naturally outgrow it. While, indeed, the large majority do outgrow this manner of speech, we should not put this extra burden upon children by having them form faulty habits which must so soon and so completely be substituted by others.

Some of the most common errors of baby talk.

Substitution of

- | | |
|---------------------------------|--|
| 1. <i>d</i> for <i>g</i> (hard) | as <i>do</i> for <i>go</i> , <i>udly</i> for <i>ugly</i> , <i>bid</i> for <i>big</i> |
| 2. <i>f</i> for <i>th</i> | as <i>fink</i> for <i>think</i> , <i>free</i> for <i>three</i> |

- | | |
|--|--|
| 3. <i>t</i> for <i>k</i> (or hard <i>c</i>) | as <i>tan</i> for <i>can</i> , <i>tat</i> for <i>cat</i> , <i>tar</i> for <i>car</i> |
| 4. <i>th</i> for <i>f</i> | as <i>thour</i> for <i>four</i> |
| 5. <i>v</i> for <i>th</i> | as <i>muver</i> for <i>mother</i> , <i>farver</i> for <i>father</i> |
| 6. <i>s</i> for <i>sh</i> | as <i>soe</i> for <i>shoe</i> |
| 7. <i>sh</i> for <i>ch</i> | as <i>shair</i> for <i>chair</i> |
| 8. <i>w</i> for <i>r</i> | as <i>wun</i> for <i>run</i> , <i>west</i> for <i>rest</i> |
| 9. <i>w</i> or <i>y</i> for <i>l</i> | as <i>wook</i> or <i>yook</i> for <i>look</i> |
| 10. <i>s</i> for <i>th</i> | as <i>wiss</i> for <i>with</i> , <i>sink</i> for <i>think</i> , <i>sin</i> for <i>thin</i> . |

Elimination of

1. *r* as *bed* for *bread*, *boke* for *broke*
2. *l* as *pease* for *please*, *ittle* for *little*, *bow* for *blow*
3. *y* as *oo* for *you*, *es* for *yes*
4. *h* as *ow* for *how*, *ooze* for *whose*

Corrective procedure. In correcting baby talk two points should be kept in mind. Isolated consonant sounds are, in most cases, more difficult for the child than sounds combined with vowel sounds. Thus, it is easier for a child to imitate the teacher saying *kay*, *kaw*, *ku*, etc., than it is to imitate the teacher in pronouncing the hard *c* alone. The second point to keep in mind is that in correcting the pronunciation of a sound, the corrected form of the sound should not be presented with words formerly mispronounced. Combine the correct sound with various vowel sounds in new combinations, for the child has no incorrect auditory imagery in these cases and will have practically no difficulty in learning them.

When consciously trying to correct existing incorrect habits, the wrong habits are often strengthened. The nervous system knows no negative; everything is positive for it. For example, if a child has trouble with the words *go*, *good*, *got*, *get*, he would, to an extent, strengthen the faulty habits by thinking to himself, "I must not say *do*, *dood*, *dot*, *det*." Each time that he thinks this he gives himself visual, auditory, and motor imagery of the incorrect habits. To have his teacher tell him not to say *dood* would likewise

strengthen the incorrect speech habit. A better procedure would be to drill the child with such combinations as *gay*, *gah*, *gaw*, *gu*, until he definitely acquired correct motor habits. He can then be taught to apply these motor habits in familiar combinations.

When the child is able to use the correct motor habits in isolated words, the next step is to give him drill in using the words in short sentences, or in simple nursery rhymes in which the desired speech sounds recur; as, "Goosey, Goosey Gander" for the hard *g*, "Old King Cole" for *k* or the hard *c*.

Occasionally cases of infantile perseveration are found among adults. One authority¹ says that "patients who persist in infantile habits of speech often do so deliberately on the assumption that speech infantilisms are, in some mysterious way, 'cute.' Young women, for example, are often quite frank in numbering speech infantilisms among their feminine charms. The idea here seems to be that infantile mannerisms of speech imply innocence and helplessness — a combination which no male is supposed to be able to resist."

2. *Defects of carelessness*

Carelessness of speech is characterized by two major defects, sound-unit substitutions and sound-unit omissions.

Sound-unit substitutions. When a sound unit occurs at the end of a syllable, or when it occurs at the end of an unstressed syllable, it is said to occupy a weak position. When occurring at the beginning of a stressed syllable, it is said to occupy a particularly strong position. The careless speaker unconsciously subjects certain sounds (usually those in weak positions) to the influence of other adjoining sounds (usually

¹ Borden, R. C., and Busse, A. C. *Speech Correction*, p. 222. F. S. Crofts and Company, 1925.

those in strong positions). Common sound-unit substitutions are shown in careless utterances such as the following:

natchure for *nature*; *picthure* for *picture*; *travelt* for *traveled*; *wim* for *whim*; *wich* for *which*; *wen* for *when*; *wat* for *what*; *univorm* for *uniform*; *spezivicashun* for *specification*; *ledder* for *letter*; *madder* for *matter*; *ladder* for *latter*; *paggage* for *package*; *pigging* for *picking*; *haf to* for *have to*; *uff course* for *of course*; *collech* for *college*; *privilech* for *privilege*; *knowdech* for *knowledge*; *lebem* for *eleven*; *sebem* for *seven*.

Sound-unit omissions. The careless speaker also has a tendency to elide or to simplify his speech by eliding sound units; that is, he omits sounds which necessitate delicate or difficult articulatory transitions. Common forms of elided utterances are as follows:

gimme for *give me*; *lemme* for *let me*; *deps* for *depths*; *breads* for *breadths*; *wids* for *widths*; *slep* for *slept*; *tol* for *told*; *col* for *cold*; *ole* for *old*; *secetary* for *secretary*; *liberry* for *library*; *histry* for *history*; *battry* for *battery*; *recanize* for *recognize*; *boundry* for *boundary*; *awright* for *all right*; *awready* for *already*; *dooty* for *duty*; *bloo* for *blue*; *Toosday* for *Tuesday*; *gentlemen* for *gentlemen*; *praps* for *perhaps*.

Correction. In order to correct carelessness of speech, the instructor must develop a desire for distinct articulation. This is usually a very difficult procedure, for the careless speaker, as a rule, is unambitious for clear enunciation. His friends often speak with the same carelessness, and should he try to speak otherwise, he thinks, it might seem an affectation. The boy who said he "wad ruther talk like an honest wukkin' man thin a smart Alik or a sissy dood," aptly showed his satisfaction with his economic status and an antipathy toward culture which he associated (perhaps as a "defense mechanism") with undesirable characteristics.

The instructor must convince the student that careful speech is a generally accepted index of culture and refine-

ment and that, in every worth-while field of business, advancement often depends upon careful speech, and that careful speech is usually a prerequisite for social acceptance among the majority of educated people. After a genuine desire for careful speech has been established, it is comparatively easy to acquire correct habits by practice.

There are many texts available which contain material for practice in enunciation, articulation, and pronunciation. The following alliterative sentences are illustrative of such material offered for the purpose of training one to enunciate clearly and distinctly through attentive practice:

1. Benjamin Bramble Blimber, a blundering banker, borrowed the banker's brichen broom to brush the blinding cobwebs from his brain.
2. Balmy breezes bore my bark beneath balconies and bridges, by balustrades and barges, where boys bowed becomingly to beauties; but Bill the boatman bumped the boat about the breastwork of the breakwater.
3. Deaf doddering Daniel Dunderhead dictated difficult didactic disingenuousness.
4. Do, Daddy, do dance drolly and delightfully down the drawing-room with dear, dry old David Dandy.
5. Fast flew the fiend fighting the fiery flames, flashing fearfully forth.
6. Gayly the gleaners gathered the glossy golden grain.
7. John, just join Jane and jam the japanned jug of jewels, which the jumping jilting Jack has judged Jockey James to have juggled behind the joists.
8. Little lazy limping Lily Lane let a little lame lamb lie lonely on the lovely lawn.
9. Man, master, maid, made mad by many mishaps, move much more mechanically mid mud and mire.
10. Peter Piper picked a peck of pretty prickly pears. If Peter Piper picked a peck of pretty prickly pears, where is the peck of pretty prickly pears that Peter Piper picked.
11. Querulous quips were quoted by quiet Queenie Quilp.
12. Round the rough and rugged rocks the ragged rascals rudely ran.

13. She sells sea-shells; shall he sell sea-shells? *
14. The squat, square, squinting sweep spluttered and squalled in the surging deep. The squire swam swiftly, and splash! the squinting sweep saved without a crash.
15. When a twister, twisting, would twist him a twist, for twisting his twist three twists he will twist, but if one of the twists untwist from the twist, the twister, untwisting, untwists the twist.
16. The whale wheeled, whirred, and whirled in the whirlpool.

3. Cluttering

Nature of defect. While in lisping, a definite set of sounds are mispronounced, in cluttering, all sorts of sounds are affected. Cluttering is characterized by great nervousness that shows itself in exceedingly rapid and indistinct speech. The clutterer's great *haste* in speech does not permit him to form or to combine sounds correctly — not his great speed. A normal person can speak correctly as rapidly as a clutterer. The clutterer's nervousness is the cause of his defective speech. Breath nervousness (spasmodic and irregular breathing) also characterizes this form of defective speech.

Cluttering is usually combined with stuttering, but not invariably so. In cluttering there is nervous haste, while in stuttering there is nervous fear. The clutterer is negligent about his speech and speaks better the more he thinks about it. The stuttrer is overanxious about his speech and speaks better the less he thinks about his speech.

Correction. Remedial procedure must be directed at basic causes of the condition. The nervousness must be combated by medical treatment, rest, and relaxation. A proper and wholesome mental attitude must be established, and then therapeutic work directly pertaining to enunciation of words can be begun. Tongue gymnastics for strengthening lingual muscles, as well as to make the patient conscious of the possibilities of tongue action, are desirable. Very distinct enunciation will make the clutterer speak slowly.

4. *A monotonous voice*

Causes. A monotonous voice is characterized by persistent sameness of pitch and intensity. There are many causes for this condition. The most common and those that are subject to treatment are cited.

1. *Lack of variety of thought and emotion.* Poverty of thought and emotion, as well as lack or little change of thought and emotion, is often the cause for a monotonous voice. It can be corrected in those cases where the patient is capable and willing to enlarge or enrich his mental and emotional life.

2. *Exclusive intellectuality.* A constant preoccupation with intellectual matters often leaves no room for emotion. Voice monotony characterizes this preoccupation.

3. *Lack of training.* In many isolated, backward communities children read and often speak in monotonous sing-song manner. This is the result of having had no training in expression, of reading or repeating material that the mind is not grasping, or of imitating the speech of other children. Remedial procedure would, of course, attack existing conditions contributing to these conditions. Simple, interesting material that can be understood and about which the child can become enthusiastic should be provided for reading and for conversation.

4. *Weariness.* Extreme weariness is also a cause of voice monotony. Physical exhaustion brings on fatigue of muscles, vocal cords, and other parts of the vocal mechanism. The energy required to make sensitive and delicate responses is lost. Overexertion or constant use of the voice, of course, tires the various parts of the vocal mechanism directly. The monotonous condition is cured when the weariness of the vocal apparatus is cured by rest and relaxation.

5. *Disease.* A uniformity of vocal pitch and intensity is

often the result of illness, and can be cured only by treating the disease itself. Many forms of nerve and brain conditions affect the vocal mechanism in characteristic manner and are thus of diagnostic value. The physician is needed in these cases.

5. *Hoarseness and harshness*

Causes. Hoarseness of speech is an unpleasant, raucous, husky, or "graty" condition, usually due to inflammation of the mucous membrane of various parts of the vocal mechanism. Here again a physician needs to make the diagnosis and outline the steps for treatment. Nervous fatigue is a common cause for hoarseness.

1. *Uvular elongation.* An elongated uvula has a tendency

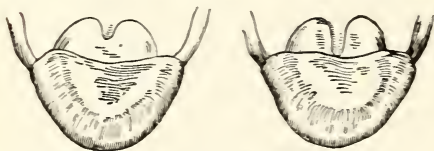


FIG. 22. NORMAL AND ELONGATED UVULA

1. Normal uvula. 2. Elongated uvula.

to irritate the mucous membrane and thus cause inflammation of the pharyngeal wall. When this membrane is inflamed, it interferes with

the function of the pharynx as a resonator, and prevents a rich, full tone quality of speech. (See Fig. 22.)

2. *Enlarged tonsils.* Inflamed, enlarged tonsils encroach upon the pharyngeal cavity and impair its capacity for resonance, and are important factors in causing hoarseness. Normally the tonsils appear as small pinkish growths barely distinguishable against the side walls of the throat. When inflamed they are a vivid red and many times their normal size.

While a hoarse voice needs a physician's attention, a harsh voice needs the attention of the teacher and the psychologist. Harshness often persists permanently because the mental

states lying back of it are usually more or less permanent. An intense mental state, a miserly, revengeful mental condition is expressed in the voice. The smooth, fine qualities of the voice are dispelled. The mental states must be enduring; the attitudes that have become permanent moods are those that affect the voice permanently. Extreme disappointment, selfishness, or a calloused mental condition may become so profound that it controls every act and finally finds its expression taint even in the voice.

Correction. In order to treat vocal harshness the new mental outlook must first be established. The hard, repellent, revengeful, embittered state must be eradicated. High motives of conduct, and a wholesome and cheerful mental outlook must be established.

6. *Nasality*

Causes. When the nasal passages are obstructed, the voice has a "nasal" tone. The nares are normally used in the utterance of *m*, *n*, and *ng*. When the air cannot pass through the nose, or when portions of nasal cavities are encroached upon, these sounds will be imperfectly enunciated. The causes of encroachment upon nasal resonance cavities are obstructions from an ordinary cold, enlarged adenoids, general inflammation of mucous membrane lining the nasal cavities as in nasal catarrh, nasal polypi (abnormal growths attached to or embedded in the walls of the nasal cavities), deviated septum (a malformation of the thin vertical partition of bone normally dividing the nasal cavity into two equal halves), and hanging turbinates (inflammation of the little folds of mucous membrane which are found in the outside lateral walls of the nasal cavity).

A cleft palate, a fissure in the roof of the mouth, results in the erroneous nasalization of all "pure oral" sound units. A cleft palate may appear in almost any form, varying from

a slight split in the uvula to a decided fissure extending through both palates, the upper dentition and the upper lip; the effect upon speech varies in proportion to seriousness of the cleft.

7. *Thick speech*

In addition to the defects enumerated, any serious pathologic condition of the lips may be an important determinant of improper speech. Harelip, swollen lips, enfeebled or malformed lips cannot properly articulate the consonants. A serious malformation of either jaw may also result in thick speech if lisping does not result.

8. *Lalling*

Nature of, and correction. In some cases there is a sluggishness of tongue muscles, although there is no physical defect. This condition results in *lalling*. It is due to poor speech training or to poor speech environment. Trying to say *Let the lower lamp be lit*, when the tongue is held flat in the mouth, gives a good idea of the effect of lalling. Tongue exercise corrects the defect. After discovering the sounds with which the student has most difficulty, the trainer can combine it with the vowel sounds. For example, in teaching *t*, the student can be required to say *tay, ta, tee, taw, toh, too*. The sounds are repeated and the speed increased gradually, and are later replaced by sound combinations forming words and sentences.

9. *Foreign accent*

Defective speech showing foreign accent is most commonly characterized by a faulty production of vowel and consonant sounds, and by misplaced stress and by incorrect intonation. Foreigners learning to speak English make faulty sounds for three reasons.

1. In English they find certain sounds entirely unfamiliar to them — sounds which do not occur in their mother tongue.
2. Some sounds, while familiar to them as phonetic in their mother tongues, occur in new and unfamiliar positions in the English language.
3. In English a number of words differ so slightly in acoustic content from words of like meaning in their mother tongues that their untrained ears often fail to note any distinction at all.

When an immigrant tries to speak English without adequate phonetic instruction he has a tendency to replace new sound units of the English language with similar sounds which occur in his native tongue. It is easier for him to make the old sounds of his native tongue, and in his estimation they are similar to those he is trying to imitate. For example, the English sound *w* does not occur in German, so a German, when he tries to say "well," says "vell." He substitutes the *v*, a sound which does occur and which is very much like *w*, for *w*.

TYPICAL UTTERANCES OF FOREIGNERS TRYING TO SPEAK ENGLISH

English. I think we have no pleasure on this job.

German. I denk ve haf no pleashure on diss chop.

English. Thank you. Then you think the gentlemen took this chance?

French. Sank you. Zen you sink zee shentlemen tuk zis shanss?

English. What is this man's name?

Yiddish. Vat iss diss men'ss name?

English. I think he will visit him in the city.

Spanish. I teenk he weel veeseet heem een tee seety.

The following chart shows English sounds not found in various foreign languages.

TABLE XIII. SOUND UNITS LACKING IN VARIOUS LANGUAGES

<i>German</i>	<i>French</i>	<i>Yiddish</i>	<i>Spanish</i>
<i>a</i> as in flat	<i>a</i> as in lace	<i>a</i> as in flat	<i>a</i> as in flaw
<i>a</i> as in flaw	<i>oo</i> as in book	<i>o</i> as in note	<i>a</i> as in amid
<i>u</i> as in stub	<i>ch</i> as in choke	<i>a</i> as in amid	<i>i</i> as in bird
<i>th</i> as in thin	<i>r</i> as in roar	<i>a</i> as in lace	<i>i</i> as in will
<i>th</i> as in then	<i>th</i> as in then	<i>r</i> as in roar	<i>oo</i> as in book
<i>w</i> as in watt	<i>th</i> as in thin	<i>u</i> as in stub	<i>j</i> as in joke
<i>wh</i> as in what	<i>wh</i> as in what	<i>w</i> as in watt	<i>wh</i> as in what
<i>j</i> as in joke		<i>wh</i> as in what	<i>z</i> as in assure
<i>zh</i> as in azure		<i>th</i> as in then	<i>ng</i> as in sung
		<i>th</i> as in thin	
		* <i>ng</i> as in sung	
<i>Danish</i>	<i>Norwegian</i>	<i>Swedish</i>	<i>Roumanian</i>
<i>r</i> as in roar	<i>a</i> as in lace	<i>r</i> as in roar	<i>th</i> as in thin
<i>oo</i> as in book	<i>o</i> as in note	<i>th</i> as in thin	<i>th</i> as in then
<i>ch</i> as in choke	<i>oo</i> as in book	<i>th</i> as in then	<i>wh</i> as in what
<i>th</i> as in thin	<i>u</i> as in stub	<i>w</i> as in watt	<i>j</i> as in joke
<i>th</i> as in then	<i>ch</i> as in choke	<i>wh</i> as in what	<i>a</i> as in flat
<i>zh</i> as in azure	<i>z</i> as in zinc		<i>i</i> as in bird
<i>w</i> as in watt	<i>th</i> as in then		* <i>ng</i> as in sung
<i>wh</i> as in what	<i>th</i> as in thin		
	<i>wh</i> as in what		
	<i>w</i> as in watt		
	<i>j</i> as in joke		
	<i>y</i> as in your		
	<i>r</i> as in roar		
	<i>zh</i> as in azure		
<i>Hungarian</i>	<i>Czecho-Slovakian</i>	<i>Jugo-Slavian</i>	
<i>a</i> as in bare	<i>a</i> as in amid	<i>a</i> as in flaw	
<i>a</i> as in amid	<i>r</i> as in roar	<i>a</i> as in bare	
<i>i</i> as in will	* <i>ng</i> as in sung	<i>a</i> as in bare	
<i>r</i> as in roar	<i>w</i> as in watt	<i>a</i> as in flat	
<i>th</i> as in thin	<i>wh</i> as in what	<i>i</i> as in bird	
<i>th</i> as in then	<i>th</i> as in thin	<i>i</i> as in will	
<i>v</i> as in vine	<i>th</i> as in then	<i>th</i> as in thin	
<i>wh</i> as in what		<i>th</i> as in then	
* <i>ng</i> as in sung		<i>w</i> as in watt	
		<i>wh</i> as in what	
		* <i>ng</i> as in sung	
		<i>u</i> as in stub	

* This sound occurs, but not as an independent phonetic unit. It is encountered as the first element of the consonant compound *ng + k* or *ng + g*.

Corrective procedure. In teaching the foreigner to speak English, he must be shown the difference between the correct sound that he should produce and the incorrect sound that he does produce. This can be done by having the instructor reproduce the correct and the incorrect sounds alternately until the foreigner hears the difference. The foreigner must then be given a clear visual image of the adjustment that his speech mechanism must make for the production of the new sound. Repeated demonstration by the instructor should be followed by the patient attempting to imitate the adjustments as closely as possible by observing his attempts in a mirror. Repeating correct attempts will gradually develop that correct muscular control necessary for the production of the new sound. Continued drill will result in unconscious correct muscular action.

10. *Speech of mental defectives*

The speech of mental defectives is often characterized by thickness, or by sound substitutions and sound omissions. The inability to attend to correct speech sounds, and to distinguish between their own faulty sound productions and the correct sounds presented to them, permits the mental defectives to establish faulty imagery and faulty motor habits. The degree of speech defectiveness is determined by the degree of mental deficiency. Likewise, possible speech improvement is in proportion to the mentality of the individual.

Periodic voice disturbance. Some girls experience a voice disturbance during the menstrual period. This disturbance may vary from a slight throaty hoarseness to an almost frog-like croaking that can be understood only with difficulty. During the inter-menstrual period the subject has a normal voice. In these cases the thyroid gland becomes engorged and interferes with the normal action of the

voice mechanism. Women's voices during gestation may be affected in similar manner.

Treatment for this condition involves gland regulation and can be directed only by a physician.

11. *The Falsetto Voice*

Pubertal changes. Children, especially boys, upon attaining the age of puberty manifest voice changes. There may be hoarseness, or change of voice either to falsetto or to abnormal depth, and there is some danger that the disturbance may prove chronic.

For the adult male there is no condition more distressing or embarrassing than a shrill, high-pitched woman's voice, known as the *falsetto voice*. This voice is of a thin, shrill quality, sounding unnatural and forced, and, as its name implies, is a false voice. It is a child's voice produced by an adult, and originates at the time when physically the boy or girl is man or woman in everything but voice. Although the condition occurs among both males and females, most of the observed cases have been among males. In reference to pitch, the falsetto voice ranges between tenor and soprano.

Causes. In practically all cases, the falsetto voice is the result of faulty speech habits acquired during the time of voice change and which persist in later life. The subject's lack of muscular control and a disturbed balance in the respiratory tract also contribute to producing the falsetto voice.

Treatment. Treatment for correction of the falsetto voice involves a number of factors. The general physical and nervous condition of the subject must be at par, and any pathological conditions of the vocal organs requiring attention must be corrected. Massage is usually recommended in overcoming the faulty coördination of the laryngeal muscles. The various muscles are developed so that laryngeal balance is established. Besides muscle massage, definite

vocal exercises in lower pitches than the falsetto are prescribed further to establish this muscular coördination.

The subject's psychic as well as physical anomalies must be eliminated. The remedial procedure for the physical conditions does not, as a rule, require an extensive period of time, but it is often difficult to alter the psychical state. To the subject's ears the falsetto voice may sound agreeable, and in that case it often takes some time to teach him to recognize its disagreeable qualities. This is usually accomplished by stimulating and developing the subject's musical sense. As soon as the psychical element is overcome, the change in voice



FIG. 23. TWO FALSETTO-VOICE CASES

Before treatment the voices of these patients ranged from C^2 to G^2 , and E^2 to A^2 . After placement their voices were brought within the range of the male speaking voice, as shown above. (After Greene.)

register is comparatively easy. Figure 23¹ illustrates the change of voice register in the case of two falsetto voices. After treatment the falsetto voice in each case was brought within the range of the male speaking voice.²

¹ Greene, *op. cit.*, p. 32.

² The voice of the eunuch or the eunuchoid is characteristically a falsetto

DIAGNOSING AND REMEDYING SPEECH DEFECTS

To be effective, remedial procedure for any type of defective speech must be directed at the cause, as determined by careful analysis and diagnosis. Corrective procedure must have specific purposes, and progress must be noted at regular intervals. A detailed investigation along various lines is usually imperative. The following outline may guide the teacher in dealing with a case of defective speech:

OUTLINE FOR DIAGNOSING AND CORRECTING DEFECTIVE
SPEECH

Name.....Sex.....Nationality.....
 School grade.....Age.....
 Using dominant hand for writing?.....

I. Analysis of the speech defect

- A. Type (sounds repeated, lisped, elided, omitted, substituted, etc.)
- B. Onset (when learning to talk, upon entering school, at second dentition, after fright, at puberty, after illness, etc.)
- C. Occurrence (always, during excitement, during fatigue, in company, etc.)

II. Effect of the defect upon the child (self-consciousness, mortification, pride — as in case with lisps, Southern accent, or Bostonian accent — indifference, etc.)

III. Physical condition of the child

A. Condition of speech organs

- | | |
|-----------|-----------|
| 1. Mouth | 5. Tongue |
| 2. Nose | 6. Palate |
| 3. Throat | 7. Larynx |
| 4. Teeth | 8. Lungs |

voice, ranging between tenor and soprano. Because of the similarity in reference to pitch, although absolutely dissimilar in reference to origin, the term *eunuchoid voice* has been used synonymously with *false alto*. This has resulted in erroneously considering the false alto voice dependent upon imperfect genital development. In practically all cases the false alto voice is the result of faulty speech habits contracted at the time of voice change and retained in later life; there is no relationship with genital development.

- B. General condition of health
- C. History of past illnesses
- IV. Environment
 - A. Condition of home and standard of living
 - B. Speech associates
 - C. Attitude of associates toward subject
- V. Mental
 - A. Intelligence rating
 - 1. On language scales
 - 2. On performance scales
 - B. Rating on school achievement tests
 - C. Emotional stability
 - D. Personality and character ratings
- VI. Diagnosis and prognosis in light of above data:
- VII. Remedial procedure suggested to correct mental, physical, and environmental conditions.

<i>Specific procedure</i>	<i>Specific condition to be corrected</i>
1.	1.
2.	2.
3.	3.
4.	4.
etc.	

- VIII. Record of progress
 - 1. End of first week:
 - 2. End of second week:
 - 3. End of third week:
 - 4. End of fourth week:
 - 5. End of semester:

CASE STUDIES

1. *Baby talk*

The case. D. was the first child of doting parents. He began to say words at about ten months of age, and by the time he was two years of age he used long sentences, enunciated clearly, and spoke a great deal. When D. was three years of age, a little brother

arrived. The parents showered the new baby with affection. In a short time D.'s speech began to be characterized by infantile lisping and short sentences. Despite scoldings and frequent reminders that D. was able to talk and that he shouldn't talk like a baby, D.'s speech continued to be infantile.

Query. To what would you attribute this speech imperfection, and how would you proceed to remedy the case?

2. *A tongue-tied child*

The case. Ethel G., a bright and active child, was tongue-tied. Because of this handicap, the mother, a former teacher, taught Ethel at home for a year. When Ethel entered school in the second grade, the children mocked her speech. This made Ethel so unhappy that her mother took her daughter out of school again, and taught the child another year. When Ethel returned to school the following year, the principal gave her a very careful examination, and found that Ethel was quite ready to enter the fifth grade. Her speech was so indistinct, however, that the mother had to interpret most of Ethel's responses during the examination. At the mother's request, Ethel was excused from classroom recitation. On the playground the children again derided Ethel, and soon, because her speech was entirely incomprehensible to them, they nicknamed her "Crazy Ethel."

Although Ethel continued in school until she was fourteen, she was very unhappy, became extremely nervous, and shunned her classmates. She did exceptionally good work, and liked her teachers and her studies. At fourteen she was permitted to leave school to enter a business college to prepare herself for a typist.

Ethel was an only child. Her parents had college training and were greatly disappointed that Ethel, with her keen mind, could not adjust herself to her handicap and continue in school.

Queries. How would you have handled Ethel's situation if you had been her mother? If you had been the principal of the school? If you had been one of the teachers in the school, even when Ethel was not attending school? Ethel's parents and teachers were always "kind" and "sympathetic" to the child; Ethel considered them her only friends. Were they? What would have been the difference in Ethel's life had either her parents or teachers had just a little clinical training, even at the sacrifice of academic training?

3. *Lalling*

The case. John is an overweight, inactive child twelve years of age. His favorite pastimes are eating and sleeping. He is slovenly in his dress, is unambitious, unimaginative, and careless in his speech. Whenever any activity is suggested to him, his usual response is, "I doan wanna." For "Yes" he says "Yeah." "What do you want?" he renders a muffled "Wha wha?" Even expletives which he uses frequently, but without vigor, are given with the limited amount of effort; "Hot dog," "Atta Boy," become an inarticulate "Hoddaw" and "Addabo." John's mother has corrected his speech so often that now John pays no attention to her efforts.

Query. How would you proceed to correct John's slovenly speech habits?

4. *Accentuation*

The case. Miss C., a sixth-grade teacher, began a better-speech campaign in her room, insisting upon clear pronunciation and enunciation, when a Bostonian family moved into the community. Frederick, one of the children, spoke with a decided Bostonian accent, and entered Miss C.'s room. The children immediately tried to help Frederick correct his speech. Frederick insisted that he spoke correctly, but that all the other children in the room spoke incorrectly. Frederick's parents were very proud of their Bostonian accent.

Query. How would you handle this situation?

SELECTED REFERENCES

1. Conradi, Edward. "Speech Development in the Child"; in *Pedagogical Seminar*, vol. 11, p. 382.
2. Greene, J. S., and Wells, E. J. *The Cause and Cure of Speech Disorders*. The Macmillan Company, 1927.
3. McCullough, G. A., and Birmingham, A. V. *Correcting Speech Defects and Foreign Accent*. Charles Scribner's Sons, 1925.
4. Morrison, C. E. "Speech Defects in Young Children"; in *Psychological Clinic*, vol. 8, p. 138 ff. (1914.)
5. Root, A. R. "Special Education and the Speech Defective"; in *Educational Administration and Supervision*, vol. 13, p. 255 ff.
6. Wallin, J. E. W. "A Census of Speech Defectives Among 89,057 Public School Pupils"; in *School and Society*, vol. 3, p. 213, ff. (1916.)

CHAPTER V

THE LEFT-HANDED CHILD

Nature has bestowed on us eyes in pairs, one at the right hand and one at the left, so that if we are to see anything at the right hand we make use of the right eye... whence we always see with one eye, although we think that both are open and that we see with both.... Between the two eyes let there be placed a partition to divide the one from the other, and let us place a book before the right eye and read. If any one shows another book to the left eye, it will not only not be able to read, but it cannot even see the pages, unless in a moment it withdraws the visual virtue from the right eye and changes it to the left.... If any one places a staff before him and brings it directly opposite some crack that exists in the opposite wall, and notes the place, when he closes his left eye he will not see the staff removed from the opposite crack, the reason being that every one looks with his right eye as he uses his right hand.

PORTA, *De Refractione*. 1593

LEFT-HANDEDNESS has often been considered as something of which one must be ashamed, as if it were a physical defect or even as an evidence of mental defect. Parents have valiantly tried to compel the left-handed child to use his right hand, and then tried to conceal the fact that the child ever had left-hand tendencies.

1. *Theories as to handedness*

Theories of handedness. Of the many theories advanced to explain the phenomenon of handedness, the following are the most common:

1. *Primitive warfare.* Early students of handedness held that in primitive warfare the left hand was perhaps more important to protect the heart so that the shield was carried on the left hand, or used for balance, or for offensive seizing. The spear or club was held in the right hand. It was thought that constant employment of the spear or club originally led to a greater efficiency of that hand, and that right-handed-

ness was then transmitted by imitation and by heredity. The theory fails to recognize that the female progenitors, who did not participate in combat, would not be right-handed and the offspring would have just as great opportunity to be ambidextrous as right-handed.

2. *Position of infant in arms.* As early as Plato, writers held the theory that handedness was the result of the position in which the infant was held in arms. The one hand would be restrained and the other free to exercise and develop. Lifelong preference for the right or the left hand would then result. This theory does not take into account why the mother would hold her child either in the right or in the left arm, a fact that would, perhaps, be predetermined by the handedness of the mother. Thus, a right-handed mother would hold her infant in the left arm so that she would have the right hand free to care for the child. In that case the child's right arm would be confined and the left hand would be developed. Thus the handedness of the child would always be the opposite of the mother's handedness.

3. *Visceral distribution and the center of gravity.* The viscera are unequally distributed in the thorax. This fact has been utilized by some writers in explaining handedness in that it causes a shifting of the center of gravity of the body toward the right, since the greater weight of the liver and lungs is on that side. Shifting the center of gravity to the right side would give the limbs on the right side of the body a mechanical advantage over those on the left. The objection to this theory is that, in order to be tenable, the opposite would have to hold true in left-handed persons; the viscera of left-handed individuals would have to be transposed. This is not the case.

4. *Habit.* That handedness is due to mere habit is often offered as a solution. This does not explain the greater predominance of right-handedness.

5. *Training.* The theory that the child is early given training unwittingly by its parents does not explain the condition of left-handed children of right-handed parents. A few experiments, although not enough to give conclusive findings, have been carried out to ascertain the effects of early training. The results seem to indicate an independence of training and handedness.

6. *Blood supply of the brain.* A theory in regard to the blood supply of the brain holds that handedness is due to the fact that the asymmetrical arterial system gives unequal blood supply to the hemispheres of the brain. Later investigations, however, showed that a communicating artery of the brain equalizes the blood supply in the two hemispheres.

7. *Ocular dominance.* The ocular dominance theory advocates that handedness follows the generally more perfect development of one eye. In support of this view it is claimed that infants are generally ambidextrous, showing no hand preference until about the sixth or seventh month, or later, when eye coördination or eye preference is stabilized. That is, when the infant has discovered experimentally that of the two visual images, the one belonging to the sighting eye is the only one that can be depended upon. The hand nearer that eye will then be brought into position more easily than the further hand. This theory does not explain eye preference, nor does it preclude a concomitant and independent development of hand preference with the maturation of cerebral centers.

Dominance of one cerebral hemisphere. Pathology offers abundant evidence that the right side of the brain governs the left side of the body, and the left side of the brain governs the right side of the body. In structure, the two sides of the brain are very similar, save only for some asymmetry of convolutional arrangements. There is no appreciable difference in the weight, the size, or the area of

the cortex of the two hemispheres, yet there is a great functional difference that causes one hemisphere, called the dominant hemisphere, to be more active. The localization of functional areas is manifested when an injury to the dominant hemisphere causes a paralysis of hand, limb, or speech (articulation), while injury to the opposite side of the brain will cause no paralysis of the dominant side of the body or only slight and temporary paralysis. Injury to speech areas of the dominant hemisphere is seldom followed by permanent impairment of speech in the case of young children. The other hemisphere usually takes over and develops the functions of the injured hemisphere. In later life this adaptability disappears almost entirely.

For etiological purposes, handedness may be explained adequately as being determined by the dominance of one cerebral hemisphere. This does not explain why one hemisphere is dominant in preference to the other, nor is it necessary; for most purposes it is sufficient to consider this condition a native condition heritable by Mendelian laws.

Eyedness may also be explained as being determined by the dominance of one hemisphere of the brain, not with the absolute conviction expressed by some investigators, but rather with the assumption that since eye dominance and hand dominance show a very high relationship, both may be determined by the same dominant cerebral hemisphere.¹ The importance of native eye dominance is readily recognized, for eyedness is uninfluenced by experience (except accident or disease of the eye) and can be used as an index

¹ Anatomists inform us that the macular portions of the two retinæ involved in sighting are connected with both hemispheres of the brain; hence there is no anatomical basis for the relation between eye, hand, and brain. However, no anatomical basis has been found for localization of cerebral centers or general hemisphere dominance. It may likewise not be making too unwarranted assumptions to consider eye dominance the result of one hemisphere dominance.

to native dominance of one cerebral hemisphere and the resulting body asymmetry.

Tests for discovering native eyedness. Since eyedness has such predictable possibilities, simple tests discovering native eyedness are of value. The paper-hole test is valid, can be used with small children, and requires no apparatus.

1. *Paper-hole test.* Tear a small hole in a sheet of paper. Require the child to hold the paper at about fifteen or twenty inches from his face and look through the hole at some small object upon the floor or table. Without moving the sheet of paper, cover the child's right eye. If he is no longer able to see the small object, the child is right-eyed; if he is still able to see the small object when his right eye is covered, the child is left-eyed.

2. *Dot-fixation test.* Another test for discovering the preferred eye, while not satisfactory with small children, will



FIG. 24. THE DOT-FIXATION TEST

With both eyes open, fixate the dot at a distance of about 18 inches. Interpose a pencil midway between the dot and the face; without moving the pencil, close the left eye. Note whether the pencil seems to jump to one side. Repeat the experiment with the right eye. The eye that is open when the pencil does not seem to jump is the preferred eye.

be described because it illustrates the principles of the paper-hole test. Hold the accompanying figure at a distance of about eighteen inches from the eyes. With both eyes open, fixate the figure and hold a pencil midway between the figure and the face. Without

moving the pencil, close the left eye and note whether or not the pencil seems to jump to one side. Repeat the experiment with the right eye. The eye that is open when the pencil does not seem to jump is the dominant eye.

Both of these tests are based upon the principles of monocular and binocular vision.

Monocular vision. To have a clear image of an object in monocular vision, it is necessary to have the object in the

line of regard, the line passing from the point of regard through the nodal point of the lens to the most sensitive part of the retina, known as the *fovea* of the yellow spot. Distinct vision is limited to the point of fixation and to a very limited area immediately around it.

Binocular vision. In binocular vision the two lines of regard meet at the fixation point. The separate and slightly disparate images of the two eyes are combined and fused into a single, clear image. Since there are always two lines of regard in binocular vision, all objects not at the fixation point are seen double. This is due to the fact that single images are formed only when the light rays from an object fall upon corresponding points of the two retinae. This happens practically only when the object is at the fixation point. Rays of light from all other objects that fall upon the retinae do not fall upon the two foveas. Thus indistinct images of the objects not in the line of regard are formed. The indistinctness of these double images, our firm conviction that there is no duplicity of the actual object, as well as the fact that as a rule we do not pay attention to this phenomenon, makes it possible for the duality of images to escape detection.

In performing the experiment with the dot and pencil, instead of holding the pencil halfway between the dot and the eyes on a supposed middle line of regard between the two eyes, it was really interposed along the line of regard of the preferred eye. The rays of light from the pencil then fell upon non-corresponding points of the two retinae. Two images were formed, but the image of the right eye (in a right-eyed individual) was much nearer the fovea (not at the fovea, for then the pencil would be at the point of fixation), and hence was clearer than the image upon the retina of the left eye. That there are two images of the pencil is often not noticed by the experimenter until his attention is called to the fact.

In the paper-hole test the child holds the paper so that the hole accommodates his preferred eye; both eyes cannot be accommodated. The paper blocks the line of regard for the non-preferred eye, and when the dominant eye is covered the object fixated by it is no longer visible.

In ideal binocular vision there is always a shifting of the two images toward the middle, so that the two eyes seem to function as one. Very, very few people possess true binocular vision — vision in which the two eyes function impartially. For most individuals one eye, the preferred eye, controls vision more than the other.

For purposes of sighting or pointing, we automatically and unconsciously use either the right or the left visual line of regard, and use that exclusively although both eyes are open. We automatically suppress or disregard the imagery of the other eye. Occasionally, for purposes of extraordinary exactitude, as in sighting for shooting or in using the microscope, one eye is often closed in order to shut out its image which for the moment becomes a hindrance rather than a help.

Eyedness in relation with handedness. Since by nature we are one-eyed, no matter which hand is used for finer muscular coördinations, either will be guided by the visual line of the preferred eye. That is, if we are right-eyed, the right visual line of regard points the direction not only for the right hand, but for the left as well. If left-eyed, the reverse will of course hold true.

The hand on the same side as the preferred eye is nearer to the preferred eye and can be brought into position more easily and more quickly than the other hand when eye and hand coördination is necessary. To use the other hand would mean that the farther one would have to act in a more strained and awkward position. In summary, then, each eye separately does give a true direction, but only one of these

directions can be used when both eyes are open. The hand on the side of the body of the preferred eye functions more efficiently with the preferred eye. Hence, in most cases it is perhaps better for the child to use the hand on the same side as his sighting eye.

Tests for discovering native handedness. As yet no single test has been devised whereby an individual's native handedness can be discovered. Many tests have been suggested for this purpose, among them, tests for strength of hand grip, rate of tapping, accuracy of tracing, measurement of arm and hand bones, direction of movement in drawing, hand used in writing, eating, cutting, sweeping, batting, winding, throwing, receiving, threading a needle, using tools, etc.

Some of these tests, such as the measurement of bones, are of no value at all; others have only slight significance because they are so readily influenced by training. Close observation of the hand preference of the child in many acts commonly not supervised while the child is learning to perform them, is the best method of discovering the native handedness of the child. The following informal tests utilize some acts, and serve as practical basis in discovering the child's native preference.

1. *Cutting test.* Place a pair of scissors directly before the child and ask him to cut very carefully along an irregular line drawn upon a sheet of paper. Record the hand holding the scissors.
2. *Winding test.* Place a ball of cord with a long cord still unwound, directly before the child and ask him to wind the cord upon the ball. Record the hand that does the winding.
3. *Throwing test.* Require the child to throw a soft ball to the examiner. Record the hand used.
4. *Receiving with one hand.* During the test give the child a ball, pencil, bat, etc., while standing directly before him. Record the hand with which he receives objects.
5. *Easy reaching.* Place a ball on a table directly before the

- child and require him to take the ball. Record the hand used.
6. *Energetic reaching.* Place the ball on the table at a distance requiring an energetic reach. Record the hand used.
 7. *Batting test.* Require the child to hold a bat ready to strike a ball about to be pitched by the examiner. Record the hand that is nearer the batting end of the bat.
 8. *Thumb up test.* Require the child to fold his hands by inter-clasping his fingers. Record the thumb that is placed on top.
 9. *Eating test.* Give the child a fork or spoon and require him to eat some "imaginary" food. Record the hand used. In the case of right-hand eating habits it is usually necessary to inquire whether the child ever had tendencies to hold his spoon or fork in his left hand, since most parents train their children in regard to eating habits.

Each test should be given three times, and two preferences out of three recorded. The examiner must guard against suggesting a hand preference in some subtle way; all material must be placed or offered to the child so that it is equally distant from each hand. The child must not know the purpose of the test, for when one is conscious of the purpose a natural preference is not always made.

None of the above tests is an absolute test for native handedness, but the series, together with a test for eyedness, serve as an adequate basis for studying the child's preferences and determining which hand the child should use for writing.

Prevalence of left-handedness. The number of left-handed individuals has been variously estimated to be from as low as 2 per cent to as high as 30 per cent. Most estimates are conservative, ranging from 2 per cent to 6 per cent. The disparity may be accounted for by the differences in methods used in determining handedness. If the cerebral hemisphere dominance theory with resulting bodily asymmetry as indicated by eyedness is accepted, then the 30 per cent is the most authentic estimate, for there is no doubt but that the prevalence of left-eyedness exists in about that proportion.¹

¹ Parsons, B. S. *Left-handedness.* The Macmillan Company, 1924.

Among normal children the percentage of left-handed boys is greater than the percentage of left-handed girls.

Heritability of left-handedness. Conclusions reached by several investigators¹ who made a study of nearly five thousand individuals point to the fact that left-handedness is heritable probably as a Mendelian recessive. In some families it even may be a dominant character.

Eyedness in relation to handedness. Eyedness is perhaps the best index to native handedness, but it does not serve as an index for the degree of handedness. Many children prefer to use their right hands even though they know they are left-handed; should they be but very mildly left-handed, and perhaps never enter trades or professions requiring utmost manual skill, it may be well to permit these children to train their right hands. Research findings show that left-eyedness, although present in about 30 per cent of all individuals,² is not accompanied by left-handedness in 30 per cent of all individuals. Mills³ found 180 left-eyed children (23 per cent) among 784 presumably right-handed children. He also found 13 per cent of crossed dextrals (right-handedness but a dominant left eye) in a total of 100 cases, but says that about half of his crossed dextrals were actually shift-overs, and if he corrects for this condition, his percentage is less than 8 per cent. Downey,⁴ in testing for eye dominance, found about 25 per cent of crossed dextrals in the case of 319 superior men, and about 34 per cent of crossed dextrals in 398 cases of inferior men and women.

¹ Jordan, H. E. "The Inheritance of Left-Handedness"; in *American Breeders Magazine*, 1911, vol. 2, no. 1, p. 10.

Ramaley, F. "Inheritance of Left-Handedness"; in *American Naturalist*, 1913, no. 47, p. 770.

² Parsons, *op. cit.*

³ Mills, Lloyd. "Eyedness and Handedness"; in *American Journal of Ophthalmology*, vol. 1, no. 9, pp. 106-13. (1925.)

⁴ Downey, J. E. "Types of Dextrality and Their Implications"; in *American Journal of Psychology*, vol. 38, pp. 317-67. (1927.)

In regard to left-handedness associated with right-eyedness, Ballard¹ found that of 51 left-handed individuals, 57 per cent proved to be right-eyed. Quinan² found 14 left-handed right-eyed individuals in a group of 28; Parsons³ found only 4 such cases among his 608 right-eyed children. Mills reports 17 left-handed right-eyed cases in a total of 110 left-handed individuals.

Early predominance of right-handedness. Right-handedness has characterized the human race for many ages past, but no authentic evidence in regard to handedness has been found among animals, even among the higher forms of apes. It can be reasonably inferred that eyedness was stabilized in one eye as soon as, and not until, man's manual labors were no longer strictly animalian and began to require a high degree of visual attention and concentration.

Many ancient authorities have attested to the fact that for the most part right-handedness characterized early races. The twentieth chapter of Judges refers to the 700 left-handed Benjamite slingers; many Greek, Egyptian, and Assyrian sculptures and drawings show evidence of the right-handedness of their executors. Sir Daniel Wilson found that cave drawings of the paleolithic age are indicative of a prevalence of right-handedness, even at that remote period. Professor Cushing,⁴ late of the Smithsonian Institution, deduced from the direction of the grooves produced by the flaking of stone implements that the great majority of prehistoric artificers were right-handed. Sir John Evans, an authority on the ancient stone implements of Great Britain, reached a similar conclusion.

¹ Ballard, P. B. "Sinistrality and Speech"; in *Journal of Experimental Pedagogy*, vol. 1, p. 298 ff. (1912.)

² Quinan, C. "A Study of Sinistrality and Muscle Coördination in Musicians, Iron-Workers and Others"; in *Arch. Neu. and Psychiat.*, vol. 7, pp. 352-60. (1922.)

³ Parsons, *op. cit.*, p. 107.

⁴ See Parson, B. S., *op. cit.*, p. 56.

Left-handedness and ambidexterity. As was previously stated, ideal binocular vision is very rare. Ambidexterity is also very rare. In the case of binocular vision, sighting is not stabilized in one eye; that is, when the ambidexter reaches for something with the left hand, the movement is directed by the left eye, and when he reaches for something with his right hand, the movement is directed by the right eye. In the case of ambidexterity, both hands are equally efficient or, as is more apt to be the case, both hands are equally inefficient. Ambidexterity is possessed by the anthropoid apes; hence it is considered a more primitive form of vision. It has been found to be more common among delinquents and idiots ¹ than among normal persons. Some investigators ² found ambidexterity more prevalent among dull and backward, while still others found that it is common among lower human races, notably the Hottentots and Bushmen.

True ambidexterity is very rare, but in the case of left-handed individuals ambidexterity is often claimed and at times even simulated. Often left-handed individuals write with the right hand at times, and with the left hand at other times, eat with the left hand or the right, pitch ball with the right, etc. This is usually the effect of training the non-preferred hand in some acts, and following the natural choice of handedness in other acts where no training was instituted. The desire to seem "different" from other people often prompts these people to call attention to their non-uniformly stabilized acts.

Reversal of handedness and stuttering. A few years ago many authorities claimed that changing handedness, or an unnatural handedness, in writing caused stuttering and

¹ Sherlock, E. B. *The Feeble-Minded*. The Macmillan Company, 1911.

² Smedley, F. W. *Report of the United States Commissioner of Education*, 1902, p. 1095.

advocated a reversal of handedness as a remedy for stuttering. They reasoned that a change of handedness broke up the intimate grouping of cortical centers which necessitated a transfer of some activities to the other cerebral hemisphere. This seemed so reasonable to infer that in treating a stutterer a reversal of handedness was instituted regardless of whether the individual was right- or left-handed. This procedure did remedy some cases.

That a reversal of handedness in writing seldom results in stuttering or other speech defect was demonstrated in the schools at Elizabeth, New Jersey, when a campaign to "cure" left-handedness was instituted. In the course of four years left-handedness was reduced from 250 cases to 66 cases, and not a single case of defective speech resulted. We may infer, however, that the 66 cases who could not acquire right-handedness in writing were left-handed to a strong degree. Had these children been forced to use their right hands, many would perhaps show nervousness in various ways, among them, in speech disorders.

Why a change of handedness in writing is not followed by defective speech in the majority of children, and has actually been known to be followed by stuttering in others, may be explained by the nervous condition of the child and the methods used to effect a change. Persistently antagonistic methods used to effect a change in handedness may cause various types of disorders when nervous instability is present. In a nervous child persistent antagonism in any form can be followed by serious complications. If in order to "cure" a nervous child from walking instead of skipping, a teacher should use as drastic or persistent methods as have been used in trying to establish a preference for the minor hand, it is quite possible that a speech disorder might result along with the agitated nervousness of the child. A speech disorder is only one indication of a nervous disorder.

Which hand to use. The best clinics of the country advocate that a child be permitted to use the hand for writing that by nature he can use most efficiently. This seems to be the more desirable practice because, in critical situations requiring a high degree of manual skill, the child will always be more efficient with a trained preferred hand than with a trained non-preferred hand. Training and practice with the finer muscles used in writing will enhance the skillfulness of the writing hand. Training given the minor hand will not infringe upon the efficiency of the dominant hand in other skills, but a transfer of all the benefits that writing as a skillful exercise can have is not effected.

In the life of a child there are few benefits in conforming to right-handedness. Arrangements in situations that might possibly inconvenience the left-handed child are provided for by the alert teacher. Often in life out of school, however, the individual must use a trained preferred hand if he wishes to attain his highest degree of manual skill. In some trades and professions manual dexterity is not required; in others, as in mechanics, dentistry, surgery, art (painting and sculpturing), it is essential.

Degrees of left-handedness. In general we are natively either right- or left-sided. A study of body asymmetry has resulted in the recognition of hand, foot, eye, and ear dominance. Thus, Gould¹ has concluded that individuals are dextro-expert, generally, as to ear, eye, hand, and foot, or else they are sinistro-expert. However, we do not all show equal degrees of preference for one side or the other. Some left-handed individuals cannot be trained to use the right hand, even though careful training over a period of time is instituted; others are so mildly left-handed that they submit to training of the right hand very easily. Those who are

¹ Gould, G. M. *Right-Handedness and Left-Handedness*, pp. 18-20. J. B. Lippincott Company, 1908.

only mildly left-handed often practice many combinations of hand preferences for various activities. The number of left-hand preferences shown by a left-handed individual may be considered an index of the degree or extent to which he is left-handed.

Alternate hand preference of the left-handed individual while performing various activities has led some investigators¹ to claim that left-handedness and right-handedness are not unitary conditions. Some of these investigators have divided handedness types into four and some into six types, claiming that people cannot be divided into the two classical categories because some individuals show definite and consistent variations in hand preference. These varying preferences, however, are brought about by training or habit, and can better be used as indications of varying degrees of handedness, usually of left-handedness.

Distribution of hand preference within right-hand and left-hand groups. Haefner² studied a group of 68 left-handed children (35 boys and 33 girls) by the method of paired comparisons. Each child was matched with a right-handed child of the same sex, chronological age, and school grade. The investigator gave each group of children a series of eight tests for handedness — namely, direction of movement, throwing, receiving, easy reaching, energetic reaching, thumb up, batting, and sweeping — in order to discover the relation of each of these test activities to the dominant hand. Table XIV shows the number of children of each group who performed each test with the preferred hand.

¹ Rife, J. M. "Types of Dextrality"; in *Psychological Review*, vol. 29, pp. 474-80. (1922.)

Downey, J. E. "Types of Dextrality and Their Implications"; in *American Journal of Psychology*, vol. 38, pp. 317-67. (1927.)

² Haefner, Ralph. *The Educational Significance of Left-Handedness*, Columbia University, Contributions to Education, no. 360, p. 17 ff. (1929.)

TABLE XIV. NUMBER AND PERCENTAGE OF LEFT-HANDED
AND RIGHT-HANDED GROUPS WHO PERFORMED EACH
HANDEDNESS TEST WITH THE DOMINANT HAND

(From Haefner.)

	Left-handed group		Right-handed group	
	Number	Per cent	Number	Per cent
1. Direction of movement.....	18	26.5	53	77.9
2. Throwing.....	63	92.7	61	89.7
3. Receiving.....	49	72.1	47	69.1
4. Easy reaching.....	56	82.4	54	79.4
5. Energetic reaching.....	51	75.0	55	80.9
6. Thumb up.....	44	64.7	36	52.9
7. Batting.....	41	60.3	47	69.1
8. Sweeping.....	20	29.4	24	35.3

From the table it may be seen that in the direction-of-movement test, more than three fourths of the right-handed group used the dominant hand according to the bisymmetrical pattern; that is, from left to right, or from the body outward. However, only about one fourth of the left-handed group drew from right to left; that is, from body outward. The other findings are read in similar manner.

Total hand dominance. In order to obtain an objective measure of the total hand preference of the left- and the right-handed groups studied, a score was given to each test used in analyzing handedness. Thus a score of 2 was given for each test in which the dominant hand was used in the majority of cases, but in which the other hand was used in one or more trials; a score of one half was given for each test in which the dominant hand was used one or more times, but not the majority of times. The total possible score attainable was 16. Table XV gives the frequency of total scores and the percentage of each score for each group.

From the table it can be seen that only three left-handed individuals and three right-handed individuals used their preferred hand consistently in the tests given. The investi-

TABLE XV. VARIATION IN DEGREE OF TOTAL HAND DOMINANCE OF LEFT-HANDED GROUP AND RIGHT-HANDED MATES

(From Haefner.)

Score		Left-handed group		Right-handed group	
Size	Per cent	Number	Per cent	Number	Per cent
16	100	3	4.41	3	4.41
15	93.7	1	1.47	3	4.41
14	87.5	9	13.24	16	23.53
13	81.2	1	1.47	5	7.35
12	75.0	15	22.06	14	20.59
11	68.7	4	5.88	5	7.35
10	62.5	15	22.06	11	16.18
9	56.2	4	5.88	3	4.41
8	50.0	10	14.71	5	7.35
7	43.7	1	1.47	2	2.94
6	37.5	2	2.94	1	1.47
5	31.2	1	1.47	0	.0
4	25.0	0	.0	0	.0
3	18.7	0	.0	0	.0
2	12.5	2	2.94	0	.0

gator considers the alternating large and small frequencies and percentages due, obviously, to the rough scale which was used for scoring the tests, and prepared a simpler table, Table XVI, for the purpose of making generalizations. The data of Table XV were grouped according to the quartiles of the tests so that in Table XVI we can read that within 75 to 100 per cent of the total number of tests, which included the scores from 12 to 16 inclusive, there were 42.65 per cent of

TABLE XVI. VARIATION IN DEGREE OF TOTAL HAND DOMINANCE ACCORDING TO SCORES WITHIN EACH QUARTILE OF THE TESTS FOR HANDEDNESS

(From Haefner.)

Score		Percentage of group	
Quartile	Scores included	Left-handed	Right-handed
75-100.....	12-16	42.65	60.29
50-74.....	8-11	48.53	35.29
25-49.....	4-7	5.88	4.41
0-24.....	0-3	2.94	.0

the left-handed group and 60.29 per cent of the right-handed group. Considerably fewer than one half of the left-handed group passed three fourths or more of the handedness tests, while about 60 per cent of the right-handed group passed the same proportion of the tests. The other scores are read in a similar way.

In summarizing his findings in regard to hand dominance the investigator concluded that:

Hand dominance seems to consist of a small number of basic activities which are common to most individuals who exhibit a particular preference, plus a wide variety of combinations of minor activities. Hand dominance may vary in degree from practically one hundred per cent preference to such a low type of strength that clear differentiation from the non-preferred hand is difficult.

2. Relation of left-handedness to other traits

Left-handedness in relation to intelligence. Popular opinion frequently discriminates unfavorably against left-handedness, and statements in the literature of handedness often infer an undesirable relationship between left-handedness and intelligence.

Haefner's study is, perhaps, the only one that has determined intelligence ratings of a group of left-handed children in comparison with a group of right-handed children when sex, chronological age, and school grade were kept constant. In this study a series of standardized group intelligence tests, suited to the school grades represented by the children of the two groups, was given. The final I.Q. tabulated for each child was the average of the three I.Q. ratings the child scored in three intelligence tests. The means of these scores for each group, together with the probable error of the means, the standard deviations, and the coefficients of variation, are presented in Table XVII. On the basis of the tests used to measure intelligence, no reliable difference between

TABLE XVII. COMPARISON OF THE INTELLIGENCE QUOTIENTS OF A LEFT-HANDED GROUP OF CHILDREN WITH A RIGHT-HANDED GROUP

(From Haefner.)

Measure	Left-handed group	Right-handed group	Difference
Mean.....	110.52	109.48	1.04-1.76
S. D.....	15.1	15.4	.30
V.....	13.52	14.07	.55
P. E. mean.....	1.23	1.26	

the left-handed group and the right-handed group in mean I.Q., in standard deviation of I.Q., or in coefficient of variation of I.Q., was found.

Left-handedness and school achievement. In the same study referred to in the preceding paragraphs, an attempt was made to discover the relationship between handedness and school achievement. On the basis of the Stanford Achievement Test, no reliable difference was found between the school achievement of the left-handed group and that of the right-handed group. There was a suggestion, however, that of the two groups studied the left-handed group was slightly more variable in school achievement.

Left-handedness and physical status. Haefner also studied the height, weight, and hand strength of his group of left-handed children in comparison with his right-handed group. His findings show the following mean heights and weights of the two groups:

TABLE XVIII. HEIGHT AND WEIGHT OF 62 LEFT-HANDED CHILDREN AND 62 PAIRED RIGHT-HANDED CHILDREN

(From Haefner.)

Group	Height in inches			Weight in pounds		
	Mean	S.D.	V.	Mean	S.D.	V.
Left-handed.....	56.52	4.28	7.40	85.88	19.45	22.65
Right-handed.....	56.59	3.72	6.57	89.72	25.35	28.25
Difference.....	.07	.56	.83	3.84	5.90	5.60

According to Table XVIII, there is practically no difference between the mean heights of the two handedness groups. The standard deviations and the coefficients of variation for the left-handed group are slightly larger than the same measures for the right-handed group. A general statement that, except for a very slight difference in variation within the groups, the left-handed children and the right-handed children show no divergence in height, can be made.

In regard to the weights of the two groups of children studied, the table shows that the average child of the right-handed group is 3.84 pounds heavier than is the average child of the left-handed group. The probable error of this difference, however, is given as 2.66, which makes the divergence in mean weight entirely unreliable. Further study of the weight findings showed considerably larger variation in weight of the right-handed group, and a larger average overweight than was found in the left-handed group. The investigator's general conclusion¹ was that right-handed children are somewhat heavier and somewhat stronger than the left-handed children.

The Smedley dynamometer was used to obtain a general index of bodily strength by measuring the grip of each hand of each child. The findings are given in Table XIX.

TABLE XIX. STRENGTH OF GRIP OF 62 LEFT-HANDED CHILDREN AND 62 PAIRED RIGHT-HANDED CHILDREN

(From Haefner)

Group	Means in kilograms			
	Left hand	Right hand	Both hands	Difference
Left-handed.....	22.14	21.49	21.82	.65
Right-handed.....	22.36	24.61	23.48	2.25
Difference.....	.22	3.12	1.66	

¹ Haefner, *op. cit.*, p. 79.

The table shows that the left-handed group of children made a mean score of 22.14 kilograms with the left hand, a mean score of 21.49 kilograms with the right hand, and a mean score of 21.82 kilograms with both hands, and that the difference between the scores of the two hands was .65 kilograms. The data for the right-handed group is read in a similar way. In comparing the two groups, the right-handed children showed a greater strength of grip for each hand, and for the mean of the two hands, than did the left-handed children. The difference for the left hands of the two groups is small numerically, but it is based upon a comparison of the non-preferred hand of the right-handed group with the preferred hand of the left-handed group. The investigator found the difference between the strength of the right hands of the two groups to be 3.12, with a probable error of .74, which made this difference statistically reliable. The standard deviations and the coefficients of variation of the two groups, which are not duplicated in our table, do not show large differences.

In general, the right-handed group showed superior hand strength on the average as compared with the left-handed group, although the margin of reliability was not large. The degree of variability in hand strength within the two groups was found to be very similar.

Left-handedness in relation to interests. In addition to the more readily measured factors reported, Haefner also attempted to measure certain less tangible school elements such as interests, school adjustment, and general emotionality. A three-page interest blank, closely following the interest blank used by Terman¹ in his study of genius children, was used as the basis of this portion of the study. The blank contained questions in regard to school adjustment,

¹ Terman, L. M. *Genetic Studies of Genius*, vol. 1, pp. 363-64; 377-78; 388.

preference of school subjects, general activities, games, and questions in regard to emotional experiences. The investigator's findings are quoted as he stated them in summary:

Hand preference does not seem to be closely related to the general interests of children. The interest of children in the various school subjects seems to be slightly but not significantly affected by their hand preference. Of the two handedness groups under consideration the left-handed group plays and prefers a somewhat larger number of games than does the right-handed group. The left-handed group tends to play and to prefer group games somewhat more than does the right-handed group. Both groups of children play and prefer group and intellectual types of games rather than others.

Left-handedness in relation to school adjustment. The policy of the school which the children of the reported study attended, was to award an "Effort and Conduct Button" each month to each child whose record in effort and conduct had been satisfactory. The child was privileged to wear the button as long as his adjustment to the school was expressed in acceptable manner. This measurement was admittedly somewhat crude; on this basis, however, the left-handed group seemed to be slightly better adjusted to the school situation than was the right-handed group.

Left-handedness in relation to general emotionality. The two groups of children were asked to write down all the things in school or at home that troubled or worried them, and to specify which thing of each group of things troubled them most. The children's reported worries were then grouped under eight large types, as follows: school subjects; school standing; relations with people in school; out of school activities; home relations; personal appearance; health problems; and moral problems.

There was little evidence that specific school subjects as the cause of children's worries were related to handedness. Left-handed children did not list subjects requiring a large

amount of manual precision, such as penmanship, manual training, physical training, and sewing, as causes of worry. The more academic school subjects — grammar, spelling, reading, history, composition — were mentioned somewhat more frequently by the left-handed boys as causes of worry than by the right-handed boys. The sex differences stood out more prominently than did the handedness differences. Girls of both groups were much more concerned about matters which were listed under "school standing" than were the boys of the two groups. The relation of the worries for the two handedness groups was presented in the following table.

TABLE XX. NUMBER AND PERCENTAGE OF VARIOUS CLASSES OF WORRIES REPORTED BY 63 LEFT-HANDED CHILDREN AND 63 RIGHT-HANDED CHILDREN

(From Haefer.)

Class of worry	Left-handed group		Right-handed group	
	Number	Per cent	Number	Per cent
1. School subjects.....	75	41.3	66	36.6
2. School standing.....	62	33.6	62	34.4
3. School people.....	6	3.1	15	8.3
4. Outside activities.....	14	7.6	9	5.0
5. Home relations.....	8	4.4	10	5.5
6. Personal appearance.....	4	2.2	3	1.6
7. Health.....	9	4.9	8	4.4
8. Moral problems.....	3	3.1	7	3.8

The significant thing about these findings, the investigator points out, is not the differences between the types of worries of the two groups of children, but rather the types of things about which both groups worry. For the left-handed group 75 per cent of the worries, and for the right-handed group 70 per cent of the worries, concern school subjects and school standing. He adds, if to these two types of worries are added worries concerning school people, which includes teachers and pupils, the total of the three makes up nearly

80 per cent of the things which these children worry about. The reports were made at the close of a school term, so probably there was an increase of school worries.

In regard to the worries of the left-handed children in comparison with right-handed children, there was very little difference with respect to the types of things that aroused emotions of worry.

Prevalence of left-handedness among defective children.

Perhaps the reason some people have associated left-handedness with undesirable mental traits is due to the fact that some careful studies of defectives and delinquents have shown that left-handedness is more prevalent among them than among normal children. Thus Gordon,¹ in an extensive investigation among children in ordinary schools and among children in schools for mental defectives, found the following percentages of left-handedness:

Per cent of left-handedness in ordinary schools 7.3 (based upon 3298 children from 4 to 14 years of age).

Per cent of left-handedness in mental defectives 18.2 (based upon 4620 children from 8 to 16 years of age).

While in ordinary schools the percentage of left-handedness among boys is greater than among girls, Gordon found in the schools for mental defectives the percentage of left-handed girls was about 25 per cent higher than that of boys. Gordon pointed out that among normal children the left-handed are frequently the most efficient and capable, but among the mental defectives the reverse was found to be the case; left-handedness frequently accompanied marked deficiency. These findings led Gordon to formulate a tentative hypothesis, namely, that:

There seems, therefore, to be good reason to believe that there are certainly two distinct types of left-handedness: (1) Those who are

¹ Gordon, Hugh. "Left-Handedness and Mirror Writing, Especially Among Defective Children"; in *Brain*, vol. 43, pp. 312-68. (1920.)

naturally left-handed; that is, those who have a dominant right hemisphere. (2) Those who are naturally right-handed, but who have been driven to the use of the left hand in some of their activities, owing to some defect of the nervous or muscular system.

Thus these left-handed mental defectives, according to this hypothesis, are largely pathological types. The left hemisphere is affected and this disturbance interferes not only with the proper functioning of the right hand, but also with the functioning of many of the higher intellectual centers.

Quinan¹ also presented an hypothesis that crossed dextrality or sinistrality may be due to asymmetrical functioning of the nervous system, and hence is bound up with psychopathic tendencies. This theory would explain the high percentages of apparent ambidexterity found among various types of mental deviates.

We may add that insistence upon making a definitely left-handed child right-handed forces asymmetrical functioning of the nervous system, and may aggravate a serious nervous condition which in turn may contribute to neuroses and delinquency.

3. *Left-handedness and handwriting*

The left-handed child learning to write. In a bulletin to the teachers of Cincinnati the following advice in regard to the treatment of the left-handed writers was given:²

Writing with the left hand is, at best, difficult and awkward, but especially so when not done in the right way, and probably three fourths of the left-handed writers write in the wrong way.

They place their paper in practically the same position as it is placed for right-handed writing. This forces the writer to place

¹ Quinan, C. "A Study of Sinistrality and Muscle Coördination in Musicians, Iron-Workers and Others"; in *Arch. Neu. and Psychiat.*, vol. 7, pp. 352-60. (1922.)

² Condon, R. J. "Advice with Regard to the Treatment of Left-Handed Writers"; in *Elementary School Journal*, vol. 27, p. 490. (1927.)

his pen above the line of writing and necessitates moving the entire arm eight or ten times in writing across the page. When done in this way, the writing is invariably cramped and illegible, and it is a painfully laborious performance for the writer.

The paper in left-handed writing should be placed just opposite to the position for right-handed writing, thus making it easy and natural for the writer to do his work with the hand and pen below the line of writing.

This is not a theory but a fact that is being demonstrated daily in our schools, for we have many left-handed writers who do their writing in the right way and write legibly, rapidly, and with ease. It is almost impossible to change this bad habit once it is formed, but it is comparatively easy to teach the right way in the primary grades. First- and second-grade teachers should, therefore, see that all children who write with the left hand learn to do so in the right way, with the paper in the correct position for left-handed writers.

In addition, the teachers were asked to give special consideration to the question of lighting the desk at which the left-handed pupil works, so that he is not writing in his own shadow; that is, care should be taken to give the left-handed writer the same benefit of lighting that is secured for one who uses his right hand.

The left-handed teacher. The left-handed teacher (using left-handed methods) of primary grades may have serious effects upon right-handed children. Right-handed children should be taught to write by right-handed methods, and left-handed children by left-handed methods. The acquisition of writing skill is a complicated procedure for the young child. Associations, generalizations, and abstractions must be made, as well as training muscles to function more accurately than they have ever functioned before; complicated eye-hand coördinations must be established. If, in addition to these factors, a child must also form habits of direction of hand movement opposite from those demonstrated before him, a great and most unnecessary burden

is instituted upon him. The left-handed teacher writes centripetally (toward her body), but requires her pupils to write centrifugally (away from the body). In the case of a right-handed teacher of a left-handed child the situation is still more complicated by the fact that centrifugal arm and hand movements are more easily performed than centripetal. The left-handed child must establish the more difficult movements. This may account for the generally poor penmanship of many left-handed writers.

Besides the direct influence a teacher's left-handedness may have upon her pupils, and which she can remedy, there is the added factor that the left-handed teacher may unconsciously be over-ready to establish left-handed writing habits. The teacher may often have memories of unpleasant attempts to acquire right-handedness, and hence may be over-ready to allow a child to establish left-hand writing habits without making thorough examination of the child's handedness. An extreme situation of this kind was called to the writer's attention a short time ago.¹

A study of hand-dominance.² In a second-grade group of 34 children, 16 were writing with their left hands. Both the first- and the second-grade teachers of the group were left-handed. Since it seemed improbable that so large a percentage of an unselected group of normal children would be left-handed, a study of the group was made in order to discover, if possible, the native hand-dominance of each of the left-hand writers. A series of nine tests for handedness and a test for eyedness was given each child. The findings gave the distribution of preferences shown in Table XXI.

¹ Scheidemann, Norma V. "A Study of the Handedness of some Left-Hand Writers"; in *Pedagogical Seminary and The Journal of Genetic Psychology*, December, 1930.

² This study was carried out by the writer and Mrs. Hazel Colyer of the Los Angeles city schools, second-grade teacher of the group of children studied.

TABLE XXI. HAND PREFERENCE AND EYE PREFERENCE OF 16
LEFT-HAND WRITERS OF A SECOND-GRADE GROUP OF 34
NORMAL CHILDREN

Test	Ervin	Nancy	Carl	Shirley	Marvin	Yvonne	Vera May	Richard	Roberta	Jack	Melville	Raymond	Cecile	Mary	Anita	Jean
Cutting	R	R	R	R	R	R	R	R	L	L	R	R	R	R	R	R
Winding	R	L	L	R	R	R	R	R	L	L	L	L	R	R	R	R
Throwing	R	L	R	R	R	R	R	R	L	R	L	R	R	R	R	R
Receiving	R	L	R	R	R	R	R	R	L	L	L	L	R	R	R	R
Easy reaching	R	L	R	R	R	R	R	R	L	L	L	L	R	R	R	R
Energetic reaching	R	L	R	R	R	R	R	R	L	L	L	L	R	R	R	R
Thumb up	R	L	R	R	R	R	R	R	L	L	R	L	R	L	L	R
Batting	R	R	R	R	L	R	R	R	L	L	R	L	R	L	L	L
Sweeping ¹	R	L	L	R	R	R	R	L	R	R	R	L	R	R	R	R
Eyedness	R	L	L	R	R	R	R	R	L	L	R	L	R	R	R	L

¹ The method of scoring this test was not in accordance with Rife (see *op. cit.*), who scored the hand nearer the sweeping end of the broom. However, he says: "From extended observation I am sure that the majority of the human race use the broom and the shovel left-handed, and the ball bat right-handed" (*op. cit.*, p. 475). Since the majority of the human race is right-handed, perhaps the way the majority hold the broom may be considered the right-handed way. Downey (*op. cit.*) in commenting upon this test said that consideration must be given "not only to the relative position of the hands in sweeping but also the movements by which the broom is manipulated. There are individuals who place the left hand below the right on the broomstick and who are called left-handed sweepers, but who employ the left hand merely to steady the broom; the right hand exerts the pressure and does the guiding."

No attempt was made in this study to determine which hand exerted the pressure. The relative size of broom and child involved still another factor, making the test not comparable with a sweeping test for an adult. Many of these second-grade children had not established sweeping habits; two children placed their right arms over the broomstick, holding the broom steady in their arm-pits.

Influence of the teacher in handedness. According to these findings, ten of these left-handed writers seemed to be definitely right-handed, and two others were perhaps but very mildly left-handed and under other conditions would undoubtedly have established right-handed writing habits. Conferences with the mothers and interviews with the children brought out the following interesting facts:

In 4 cases the mother did not know her child was writing with his left hand. In each case the child had been using his left hand for writing during a period of two years.

The immediate influence for left-hand writing, according to careful investigations, was found to be the left-handedness of the first-grade teacher in 1 case, the left-handedness of the mother in 1 case, and the left-handedness of playmates or classmates in 4 cases. The immediate influence could not be found in 6 cases.

In each of the 12 cases the child gave every evidence at home of being right-handed. (At school, too, if it had been noted.)

Although the left-handedness of the teachers, in both the first and second grades, was found to be a direct influence in establishing but one case of left-hand writing, yet we may safely assume that the left-handedness of these two teachers played a very important rôle in establishing left-hand writing habits in the case of these children. A left-handed teacher who has had unhappy and unfortunate experiences in trying to establish right-hand writing habits is, perhaps, more apt to permit a child to establish left-hand writing habits than is a right-handed teacher or a left-handed teacher who has successfully established right-hand writing habits. This was clearly shown in one of the cases — Richard, of the present study.

Richard's mother was so certain her child was right-handed that during his first year at school she asked that her child be taught to write with his right hand, yet the first-grade teacher permitted the child to use his left hand because he picked up his pencil with the left hand. At the beginning of the child's second-grade work, the mother made a special visit to the school to ask that her child be changed to right-hand writing habits; she was told it was better not to interfere with a child's handedness. Since both of these teachers were left-handed, they might have been prejudiced toward having the child write with his left hand, just as right-handed teachers may be prejudiced toward having a child use his right hand.¹

¹ See Scheidemann, Norma V., and Colyer, Hazel, "A Study in Reversing the Handedness of Some Left-Handed Writers"; in *The Journal of Educational Psychology*, March or April, 1931.

Feasibility and methods of reversing handedness in writing. A teacher may encounter children who have established writing habits with the non-preferred hand. It may be feasible to reverse the writing-handedness of these children, especially during the early grades. The feasibility of effecting a reversal must be determined by a careful study of each case. The following factors may guide the investigator in deciding upon the feasibility of reversing wrong writing-handedness:

1. The child's degree of right- or left-handedness.
2. The nervous condition of the child.
3. The child's prospects for the future.

If a child is but mildly right- or left-handed — that is, if he uses his left hand for some and his right hand for other acts requiring a fine muscular coördination, as well as in acts requiring eye-hand coördination — it may not be to the child's particular advantage to reverse his writing-handedness.

The nervous condition of the child is an important factor in determining the desirability of reversing wrong writing habits. Many teachers are hesitant in reversing an extremely nervous child's handedness, while they would not hesitate in the case of a phlegmatic or a well-poised child. Usually the nervous child, however, benefits more from a reversal if he is using his non-preferred hand. Requiring a child's nervous system to function asymmetrically aggravates a nervous condition. The calm and well-poised child may reverse writing-handedness with no emotional disturbance; his benefits are, as a rule, entirely those of greater writing skill. The very nervous child may benefit in nervous stability as well as in writing skills.

The child concerned. The prospects of a child's future need also be considered when contemplating a reversal of handedness. A child who will stop school as soon as the law

permits him to do so, and who will use his writing habits only to write an occasional letter and to sign his name, may well be permitted to continue to write with his non-preferred hand if the habit is well established. A child who may enter a trade or profession requiring extreme manual dexterity should, perhaps, exercise his writing habits with his dominant hand, so that that hand may have all possible training in dexterity as well as having the advantage of customarily functioning with the preferred eye. Surgery, dentistry, painting and sculpturing, watch repairing, and designing require great manual skill. Any work requiring excessive writing, such as stenography and professions in which people often prefer to do their note-taking and creative writing long-hand, may profit eventually by having writing habits established with the dominant hand.

The particular methods to be used in effecting a reversal of handedness must fit the particular case. Some children need scarcely more than an explanation and some enthusiasm over their early dominant handwriting attempts. Other children require more encouragement, frequent reminding, and general procedures for training the dominant hand much like those given to beginning writers; namely, blackboard exercises involving the larger muscles of the arm, and later exercises involving hand and finger muscles. Exercises on paper and writing on paper may then follow. Reversing writing habits to the dominant hand is usually not a difficult task when the teacher can show the child the advantages of using the dominant hand, and can also show the child that he has been using his minor hand. This is best done by giving the child a series of informal tests for handedness and eyedness without the child knowing their purpose, and then showing the child his record.

Nervous children must be watched closely while the change is being effected. Writing periods must be shortened

for them, and great care must be taken to establish a desirability of the reversal by the children themselves.

Often a child, usually a left-handed child, will want to learn to write with both hands. It is better to stabilize writing habits with one hand, for like all habits the more routine and fixed this habit becomes the less opportunity for choice between the two hands will result; in some critical instances this will mean less opportunity for doubt, hesitancy, and confusion.

Training the non-preferred hand. Often the preferred hand or arm is lost or rendered useless, as by accident or paralysis. In these cases the non-preferred hand must often be trained to function with the preferred eye. In the case of a child who already was able to write with the preferred hand, the problem of letter symbols is eliminated and only the mechanics of writing need be taught. Hence progress can be rapid.

In training the non-preferred hand of war veterans,¹ the following procedures have been found effective. The subjects were required to trace on frosted slates, first simple geometric designs, sketches, and pictures, then letters, and finally whole words. The tracing was used because it automatically checked the back-slope habit which arises in left-hand writing because the index finger obscures the work. After a fair control over the left hand was achieved, the subject's work was varied by tracing a design or word and then copying it on a slate; copying on paper followed. Adults have been trained to write both legibly and rapidly within five to ten days by this method. Clay modeling was often supplemented as a means of producing deftness of movement.

¹ Burnette, Norman L. "Invalid Occupation in War Hospitals"; in Department of Soldiers' Civil Reestablishment, Invalided Soldiers' Commission, *Vocational Branch Manual*, no. 1, p. 37. Ontario, 1918.

Various schools in Germany offer a six-weeks' course to fit the men with only non-preferred arms to take up training for trades.¹ Instruction is given in the ordinary acts of life such as eating, dressing, tying knots, using simple tools, and writing. A great part of the teacher's work is to convince the men that all these things can be done with the non-preferred hand, and to encourage practice whereby efficiency can be attained. Practice in drawing, designing, and clay modeling is a part of the reëducation program.

All methods proposed for training the non-preferred hand are based upon the general principle that first the large arm muscles should be trained, preferably by the use of the blackboard; training the muscles used for finer muscular coördination should follow. Exercises in making straight lines, retraced circles, and broken and circular lines, at first with the entire arm movement, is advocated; then restraining the movement until a wrist movement is obtained; and finally, restraining the movements still more until a finger movement is included. After these exercises can be performed satisfactorily, blackboard writing is begun. The subject is usually required to make large letters with arm movements, followed by smaller letters including wrist movements, and then finally still smaller letters including finger movements. Writing on paper follows.

Some directions in regard to the proper position of the body and the paper, and for holding the pen are necessary. In writing with the right hand the paper is slightly inclined

¹ McMurtrie, D. C. "The Evolution of National Systems of Vocational Reëducation for Disabled Soldiers and Sailors"; in Federal Board for Vocational Education, Bulletin no. 15, Reëducation Series no. 3, pp. 154-55. Washington, 1918.

In the description of these six-weeks' courses it is stated that German teachers have made a scientific study of left-hand writing, and that several textbooks have been written on the subject. The writer was not able to procure these books.

toward the left; in left-hand writing the paper is slightly inclined toward the right. The pen should be held loosely and easily by the first three fingers; it should point over the left shoulder in left-hand writing, and over the right shoulder in right-hand writing. Those individuals who do not have the use of an arm to hold the paper in position can best use a metal or glass paper weight for this purpose.

4. *Left-handedness and "mirror-writing"*

Definition of "mirror-writing." Mirror-writing is described by Baldwin¹ as being a form of inscription arising when words are traced with the left hand by an exact reduplication of movements of the right hand, in a symmetrical way from the central point in front of the body, out toward the left. A form of reversed writing which can be read only when seen in a mirror, results. Many left-handed

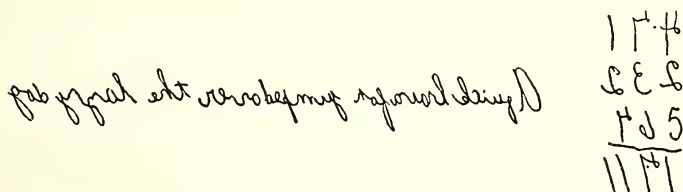


FIG. 25. FACSIMILE OF THE WRITING OF A "MIRROR-WRITER"

This subject is 8 years, 8 months old, and of American parents. Extremely left-handed. Has an aunt who is left-handed, and is an ambidextrous seamstress. A ten-year-old sister was slightly left-handed in earlier childhood. Subject has no mental or physical defects, but is exceptionally bright and shows signs of an unusually good memory. His very first attempts at writing were "mirror-wise." He now can write, in conventional style, with both the right and the left hands, but only with much effort and by means of active attention; he lapses into "mirror-writing" when attention wanes. (From A. L. Beeley, *An Experimental Study in Left-Handedness*, 1918. Reprinted by permission of the University of Chicago Press.)

children tend to write this way and some adults find they can write only in this way when trying to write with the left hand. Baldwin added that even those to whom the move-

¹ Baldwin, J. M. *Baldwin's Dictionary of Philosophy and Psychology*; Article "Mirror-Writing." The Macmillan Company, 1911.

ments when thought of in visual terms seem quite confusing and impossible; find when they try to write in the air with both hands together, from a central point right and left, that the left-hand mirror-writing movements are very natural and easy.

Leonardo da Vinci is the most striking example of a mature mirror-writer. Some of his notes were recorded in this manner.¹

Etiology of mirror-writing. Carmichael,² in reviewing the literature in regard to the aberration known as mirror-writing, says that, although we have no proof that mirror-writing is hereditary, left-handedness, which is always associated with mirror-writing, seems to have a gross structural basis, and possibly this structural basis is hereditary. To some extent there seems to be symmetry for body movement as well as symmetry for body structure. One investigator³ refers to this possibility when explaining mirror-writing by saying that this condition is probably found "in the natural tendency of the movements at one side of the body to be accompanied by symmetrical movements at the other side. In mirror-writing, for the same reason, the attention is directed to what should be the subsidiary movement, i.e., that with the left hand; and the idea of the movement, in consequence, becomes the more prominent one and therefore controls the form which the activity takes."

¹ See plate of one of Da Vinci's manuscripts, in Burt, C., *Mental and Scholastic Tests*, p. 314. P. S. King and Son, London, 1922.

Stier, in *Linkshandigkeit*, gives a case of a father and a son (officer in the German army), both true mirror-writers, who corresponded in reversed script.

² Lord, Carmichael, and Dearborn. *Special Disabilities in Learning to Read and Write*, Studies in Educational Psychology and Educational Measurement, Series I, vol. 2, no. 1, p. 46. (1925.)

³ Sherlock, E. B. *The Feeble Minded*, p. 87. London, 1911. (Quoting Heller.)

According to this explanation, the process of learning to write would show the stages in the development of mirror-writing. The first period of learning to write (the pre-learning period) is known to teachers as the "scribble period"; it is characterized by trial and error or trial and success movements. During this period the left-handed child holds his pencil in his left hand without instruction, and, as he begins to scribble, it is the left hand that makes the movements. These separate and simple responses gradually integrate into more complex movements, and finally into letters and words. Common script is not well adapted to the left-right writing of a left-handed individual, no more than is the right-left writing of a right-handed individual. At some stage (Carmichael suggests probably the one immediately following the period of trial and error) all normal children tend to invert certain letters, and this practice is much more common in left-handed than in right-handed children.¹

Each child, then, in learning to write must condition new responses and integrate them into complex habits. The left-handed child, in certain cases, may integrate out of his random left-sided movements a mirror-script rather than a normal script.

To the objections that the obviously inverted nature of the script must be apparent to all who have any visual ability at all, Carmichael points out that the ability to read script is in itself a developmental integration, and that we cannot argue that such perceptions are the same in the child as in the adult.

To the objection that according to this theory all children who are left-handed would become mirror-writers, the same investigator replies that there are many degrees of left-

¹ See Burt, C. L. *Mental and Scholastic Tests*. P. S. King and Son, London, 1921.

handedness, and perhaps only the most pronouncedly left-handed children are most apt to integrate the reversed script. For another reason why all left-handed children do not write mirror-wise, he gives the comparison with some other developmental peculiarities as follows:

It would seem that some emotional or other personality disturbance might lead to the "attachment" of this habit at a critical time (as at the close of the scribble period), with the result that it might become so strong by exercise as to inhibit the simultaneously developing and opposed perceptual correction which comes from the observation and reading of normal script and other social factors.

Baldwin's explanation. Baldwin ¹ gives a valid statement in regard to the etiology of the aberration by saying that "it is probably due in children to the incomplete association of the series of hand-movement sensations with the control series of visual sensations."

Baldwin explains ² that if a man is of the so-called "visual" type, that is, depending primarily upon his visual series, recalling in his writing the look of the letters and by comparing it with the resulting writing, and conforming his movement series to it, then any movements which violate the figure presented by visual memory are unintelligible. Such an individual must reproduce, with the left hand, the visual images as produced by the right. In other words, he must write from left to right with both hands, using visually symmetrical images; the visual series brings the movements of both hands into conformity to it. An individual may, because his movement series has grown independent by practice, remember written words not primarily by the way they look, but by the way it feels to write them, thus belonging to

¹ Baldwin, J. M. *Baldwin's Dictionary of Psychology and Philosophy*; Article "Dextrality." The Macmillan Company, 1911.

² Baldwin, J. M. *Mental Development in the Child and the Race*, p. 95. The Macmillan Company, 1894.

the so-called "motor" type in his handwriting. Such an individual must, in left-hand writing, reproduce the series of muscular sensations, as his right-hand writing established them; movements established by one hand carry the other hand also with it in a symmetrical way. His left-hand position duplicates at each movement his right-hand position when he tries the experiment of writing in the air with both hands. This results in symmetrical movements with the two hands, which is "mirror-writing" with the left hand.

Beeley¹ accepts Baldwin's explanation as occasionally being a natural characteristic of mature individuals who after having acquired a degree of skill in writing with one hand change their writing hand. He does not accept it in the case of the child whose first efforts at writing results in "mirror-forms," for that child has no muscular sensation that he is trying to reproduce. What happens in such a case is, he believes, that:

[The child's] first and early concepts of the writing-act are awry; that is to say, that as he perceives others writing in the conventional style with the right hand the imagery thus stimulated does not possess the optimum balance or association between the "visual" and the "motor" elements. While such a person does not reproduce with one hand the movement sensations experienced by the other, nevertheless the sight of those who do write normally is conceived of in "motor" terms, i.e., the most natural movements involved in a reproduction of the same. Furthermore, it is not difficult to see that such a child's "scribble-period" may serve as a process of trial and error, by means of which he readily learns that the easiest form of movement is with the left hand, and from the right to the left. In such cases as these, in which we also have extreme left-handedness, the period of "happening on to" the easier type of movement will naturally be very short, since it will take but a very few trials to reveal which is the easier form of movement.

... "Mirror-writing" is by far the easier style of writing for all

¹ Beeley, A. L. *An Experimental Study in Left-Handedness* (1918), p. 59. Reprinted by permission of the University of Chicago Press.

sinistrals. A very logical question is then, Why do not all left-handed children write "mirror-wise"? The primary reasons appear to be, however, that such left-handed children as do not write "mirror-wise" are either (a) not so extremely left-handed, or (b) not so "motor"-minded, or, conversely, possess a stronger "visual" imagery, or (c) both. As one very capable Chicago teacher has stated, "in such instances, the tendency to mirror-writing is checked by an immediate recognition of the visual discrepancy, i.e., mirror-writing could not go on in the presence of a good visual imagery."

Prevalence. Beeley¹ made a careful study of mirror-writing among the pupils of the Chicago public schools. He found that there is one mirror-writer in every group of about 2500 children of elementary-school age.

Mirror-writing and handedness. Findings show that mirror-writing is a characteristic of extreme left-handedness. Not a single case of a right-handed mirror-writer has yet been found. The few cases of right-handed individuals claiming to be mirror-writers have in each instance proved to be an individual who learned this phenomenal method of writing after observing the results of the natural mirror-writer's writing movements.

Some students of the subject inferred that mirror-writing is the natural writing of left-handed individuals when changed to right-hand writing. Beeley found that in every case mirror-writers write mirror-wise with the left hand.

Mirror-writers and intelligence. The fact that mirror-writing has been found in many subnormal individuals (of those who can write at all) gave rise to the popular opinion that mirror-writing is positively correlated with mental deficiency. Beeley's study proved conclusively that this is not the case. The distribution of intelligence among mirror-writers conforms, in general, to the normal curve. The

¹ Beeley, *op. cit.*, p. 43 ff. Findings based upon 42 cases of mirror-writers found among 106,356 unselected school children.

majority of these individuals are normal, and some possess more than average intelligence.

The following facsimiles ¹ are specimens of a precocious thirteen-year-old mirror-writer's left-hand mirror-writing and his right-hand conventional style of writing. The degree of similarity in size, form, and slant of letters, along with the many individual characteristics that are shown between the

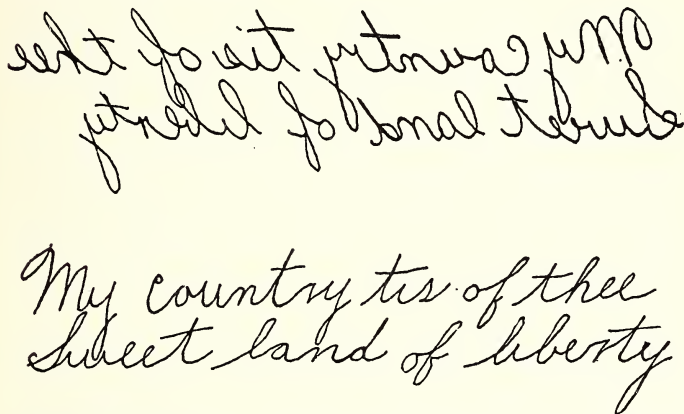


FIG. 26. FACSIMILES OF A PRECOCIOUS THIRTEEN-YEAR-OLD'S WRITING

(Top sample.) Facsimile of subject's left-hand "mirror-writing."

(Bottom sample.) Facsimile of subject's adopted right-hand style.

(From A. L. Beeley, *An Experimental Study of Left-Handedness*, 1918. Reprinted by permission of the University of Chicago Press.)

production of the two hands, is unbelievable. By tracing the first facsimile on tissue paper, reversing the paper and placing the traced copy, face downward, upon the second facsimile, the striking similarity between the two writings can be seen. This subject's first writing attempts were mirror-wise. No attempt to correct it, other than to draw his attention to the fact, were made until his second-grade

¹ From Beeley, *op. cit.*, p. 47.

teacher changed him to right-hand writing by using the blackboard method of correction. The experimenter explains the approximate equality of the two styles of writing to be due very largely to transfer of ability from one side of the body to the other, since the six years of practice with the right hand resulted in no greater intrinsic writing ability than the first two or three years of practice mirror-wise.

Correction of mirror-writing. Since the cause of mirror-writing is commonly thought to be poor visual imagery necessarily involved in the normal functioning of the hand-writing coördination, and the corresponding abnormal motor imagery, remedial procedure stresses, temporarily even in exaggerated form, the visual control involved. For this purpose simple exercises that will show the child the discrepancy between his production and the copy, and that will stimulate his visual imagery to a maximum degree, should be provided.

Teachers who have successfully corrected the mirror-writing habit do not agree upon a single corrective method. Most of them tried many exercises and, as if by accident, encountered one that was effective. Beeley¹ gives the



FIG. 27. INITIAL STROKES TO REMEDY "MIRROR-WRITING"

(From A. L. Beeley, *An Experimental Study of Left-Handedness*, 1918. Reprinted by permission of the University of Chicago Press.)

essence of several methods, essentially alike, that have been found to be successful and that seem to take into account the cause of the aberration. The child is first required to copy on the blackboard with his left hand the simple strokes, as in Figure 27. The child copies these strokes alter-

nately and repeatedly. This tests and develops his perception and his ability to reproduce the visual image. Grad-

¹ Beeley, *op. cit.*, p. 61.

ually graduated exercises, as in Figure 28, are used. The wrong form is retained in these exercises in order to show a contrast with the desired form.

The child is not allowed to write from memory for some time; a copy of the writing is kept before him to further stimulate correct imagery.

In addition to this procedure, some teachers guide the child's hand with their own throughout the entire daily writing lesson in order to establish correct motor coördination.

When teachers, as they should, notice mirror-writing in its incipency the above procedure is gone through with each letter as it is being learned, thus preventing the establishment and the automatization of the mirror-writing habit.

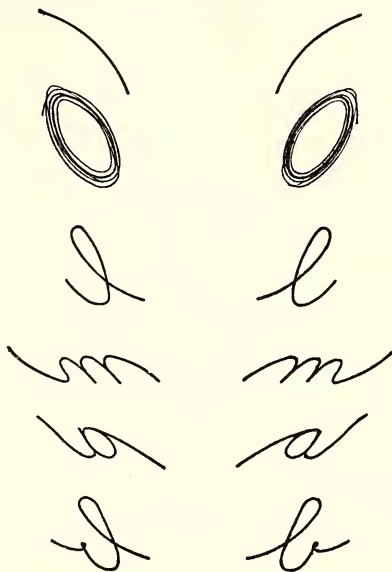


FIG. 28. EXERCISES FOR REMEDYING
"MIRROR-WRITING"

CASE STUDY OF A MIRROR-WRITER

Carmichael¹ made a detailed analysis of a mirror-writer. A few of his interesting findings are given here.

William was a nine-year-old mirror-writer. While of normal intelligence (I.Q. 94) he was found to be decidedly low in arithmetic

¹ Lord, Carmichael, and Dearborn, *op. cit.*, pp. 36-41.

and reading. William and his younger brother were the only left-handed members of a large family.

Upon request the boy was able to write either mirror-wise or a normal script. He used his left hand in each case, but changed

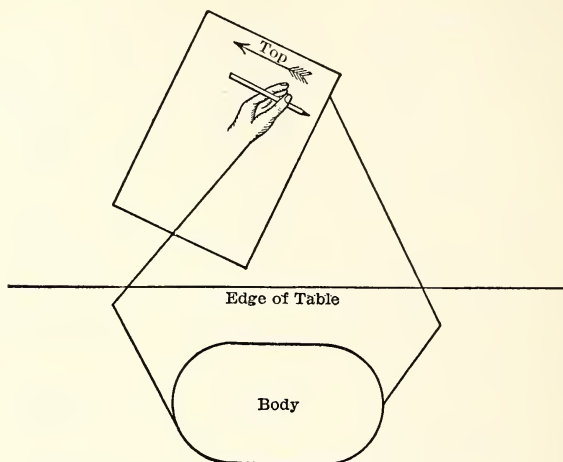


FIG. 29. SUBJECT'S POSITION IN "MIRROR-WRITING"

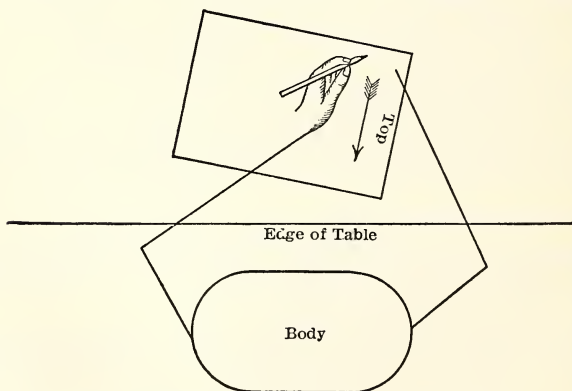


FIG. 30. SUBJECT'S POSITION IN NORMAL WRITING

the position of his arms and body in relation to the paper when changing from one form of writing to the other. Figures 29 and 30 show the positions used in each instance. While the same muscles are to some extent involved in both sets of movements, it would seem possible that these two ways of writing are quite distinct habits. In a preliminary test William was asked to write a story in mirror-script, and then to copy what he had written in direct script. Writing mirror-wise required far more time than writing normally.

In a second test the boy was required to copy, in the two methods of writing, a six-sentence story, first using the mirror-script and then the normal script. In each method he was to copy from a typewritten form. It required 32.5 seconds less time when using direct script than when using mirror-script.

In order to check up on possible practice effect, a similar test was arranged in which the child first copied a typewritten story using direct script, and then copied the same story using mirror-script. In this test the boy copied the sentences in 1 minute and 21 seconds less time than it required him to copy the same material when writing mirror-wise.

Tests in which William was required to read mirror-writing were then devised. He was unable to read any of the mirror-typewriting presented to him in six short lines, and only a few words from mirror-script. At all times, however, he was able to read his own mirror-script.

The star tracing test, requiring the subject to trace the outlines of a star while observing the writing point and paper in a mirror only, proved to be too difficult for William.

A year later when William was tested again it was found that he had made progress in reading. His I.Q. rating in the Binet retest was 87, against that of 94 before. Mirror-tracing still proved to be too difficult for him, and the investigator considered that his mirror-writing ability did not help him if, indeed, it did not hinder him in this test. William claimed he never wrote any mirror-script during the one-year interval.

The teacher at the time of the second test did not know of William's previous disability. She simply considered him as one of her very "slow" pupils. It was much more difficult for the boy to write mirror-wise at the time of the second test than it had been one year before. At the time of the second test, his mirror-script was poor in quality, and not all the words were written in true mirror-script.

DIRECTIONS FOR TESTING EYEDNESS

For convenience, steps for testing eyedness and also for testing handedness are here summarized and presented so that they may be cut out and mounted on cardboard for classroom use.

TEST FOR EYEDNESS

DIRECTIONS

1. Place a small object (bit of crumpled paper or a bright button) upon the floor or table.
2. Hold this card steady at about 15 or 20 inches from your face.
3. With both eyes open, look at the small object *through the hole in this card*.
4. Without moving this card, close the right eye. Can you still see the small object? If you cannot, you are right-eyed.
5. Without moving this card, open the right eye and close the left eye. Can you still see the small object? If you cannot, you are left-eyed.



When testing small children cover the eyes alternately for them.

For distant sighting determine some small object, as tip of flagpole, tree on a horizon, etc.

For a child reticent in speaking, permit the card to be shifted to accommodate each eye individually. If the child shifts the card to the left when using his left eye, he is right-eyed. If he shifts the card to the right when using the right eye only, he is left-eyed.

cut here

In the eyedness test, glue the directions upon a cardboard and cut out the dotted circle in the center of the card. When testing a child, hold the card so that the directions are on the under side.

DIRECTIONS FOR GIVING TESTS FOR HANDEDNESS

In giving the tests guard against suggesting a preference for one hand. Place or offer all material so that it is at an equal distance from both hands. Repeat each test three times, and record the hand preference shown in two trials for each test.

1. *Cutting test.* Place a pair of scissors directly before the child and ask him to cut very carefully along an irregular line drawn upon a sheet of paper. Record the hand used to hold the scissors.
2. *Winding test.* Place a ball of cord with a long cord still unwound, directly before the child and ask him to wind the cord upon the ball. Record the hand that does the winding.
3. *Throwing with one hand.* Require the child to throw a soft ball to the examiner. Record the hand used in throwing.
4. *Receiving an object.* While standing directly before the child, offer him a ball, a pencil, or any small object. Record the hand with which the child receives the object.
5. *Easy reaching.* Place a ball directly before the child and require him to take it. Record the hand used.
6. *Energetic reaching.* Place a ball upon a table at a distance requiring an energetic reach. Ask the child to take the ball. Record the hand used.
7. *Batting test.* Require the child to hold a bat ready to strike a ball about to be pitched by the examiner. Record the hand that is nearer the batting end of the bat.
8. *Thumb up test.* Require the child to fold his hands by interclasping his fingers. Record the thumb that is placed on top.
9. *Eating test.* Place a fork or a spoon before the child and require him to pretend he is eating. Record the hand used. For this test it may be necessary to inquire whether the child has been trained to use his right hand if in other tests he is inclined to prefer the left hand.

INTERPRETATION OF THE CHILD'S RECORD

None of these tests is an absolute test for native hand dominance, but from this series of tests and the test for eyedness you can determine, with adequate confidence, which hand the child should use in establishing writing habits.

HAND-DOMINANCE BLANK

Grade.....School.....Date.....

Tested by.....

	Children tested											
1. Cutting ¹												
2. Winding												
3. Throwing												
4. Receiving												
5. Easy reaching												
6. Energetic reaching												
7. Batting												
8. Thumb up												
9. Eating												
10. Eyedness												
Probable native hand dominance of child ²												

¹ Record "R" for right and "L" for left.

² Record in red ink.

Of all the tests given, the test for eyedness is the most reliable index for handedness. Right-eyed individuals are, perhaps, always right-handed, and left-eyed individuals are, perhaps, always left-handed.

However, a few individuals are only mildly right- or left-handed, and are transferred so easily that it is just as well for them to establish right-handedness, because many of our appliances are designed for right-handed individuals.

A right-eyed child, even though he shows left-hand tendencies in some of the tests, should be required to write with the right hand.

A left-eyed child with left-hand preferences in most of the tests given, should be taught to write with the left hand.

A left-eyed child having established, without pressure, right-handedness in most of the activities tested, can confidently be taught to write with the right hand. (It may be necessary to consult the parents in regard to the amount of pressure that was needed to establish right-handedness.

CASE STUDIES

1. *Left-hand diagnosis*

The case. Shirley is in the second grade in school; she uses her left hand for writing. Shirley's mother is left-handed, and had many unhappy experiences because of it when a child. At school she was forced to use her right hand, and suffered anguish and humiliation because her left hand was tied behind her. She became so nervous that her father had to take her out of school for a time. The mother is now neurotic.

Shirley is an only child, is much spoiled, very nervous, and immature. The mother says that Shirley as a baby used her left hand when reaching for things. She insists, too, that Shirley shows a preference for the left hand in all activities, so that she asked the first-grade teacher to allow Shirley to use her left hand for writing. In the presence of the mother, the second-grade teacher gave Shirley the nine tests for handedness and the test for eyedness mentioned in the text. Shirley did not know the purpose of the

tests. She was found to be right-eyed, and used her right hand in each of the handedness tests given. Shirley's mother watched the test procedure carefully; the only comment she made was, "At home Shirley would use her left hand for all that, because she is left-handed."

Shirley's writing is of a poor quality. At times Shirley becomes so nervous that she jumps up and down and shakes her hands.

Queries. Would you advise that Shirley be changed to right-hand writing habits? Shirley's mother objects to changing Shirley's handedness because she is convinced that Shirley is left-handed. Do you think the mother is a careful observer? Shirley's teacher first thought it might be better not to change Shirley's handedness because the child is so nervous. Is this a good reason for not changing?

2. *Left-eyedness*

The case. Walter W. has an I.Q. of 130. When four years of age, with the help of his eight-year-old sister, he learned to read. He entered school at five, and learned to write in a very short time, but his penmanship was of an inferior quality from the very beginning. His teacher soon noticed that Walter had a tendency of making some letters backward, thus, letters like *b, c, d, g, h*, etc., and numerals *2, 3, 4, 5, 6, 7, and 9*, were reversed. Walter was a close observer and careful in his work. The teacher thought that the tendency to reverse letters might be due to poor vision, and advised Walter's mother to have her child's eyes tested. Walter was fitted with glasses because his right eye, while not defective, could be benefited by a temporary use of lens. The left eye was found to be in good condition. Walter wore glasses for about a year, and the tendency to reverse letters gradually disappeared. Walter confesses that even now, at the age of ten, when he is very tired, preoccupied, or in great haste he finds that he will reverse a letter or two or reverse the spelling of two-letter words. His penmanship has remained of inferior quality.

When Walter's first-grade teacher read about the aberration of mirror-writing, four years after she taught Walter, she wondered whether Walter might by nature be left-handed, and since the child was still attending the same school she gave him several tests. She found that Walter was left-eyed, and used his left hand for batting, throwing, and energetic reaching. By questioning the mother it was learned that Walter began to use his left hand when

establishing eating habits, but the mother corrected this. The first scribbling was done with the left hand; this too, the mother corrected. Walter never wrote whole words mirror-wise.

Queries. Could the use of glasses correct Walter's reversal of letters? Had Walter been permitted to use his left hand, would he have reversed letters? Why did this habit disappear during the time that the glasses were worn? What procedure would you suggest for correcting such a tendency in a second-grade child? Why should Walter now, under the conditions mentioned, lapse into his old habit occasionally? Why does his penmanship remain poor?

3. *Left-handedness*

The case. Mr. S. was a missionary in China, and Mrs. S. was required to teach their twelve children until they were about fourteen years of age, when they were sent back to the United States to enter school. Mrs. S. was left-handed. In teaching her children, Mrs. S. was very careful not to influence them either toward left- or toward right-handedness. She would always exhibit a finished product, rather than let the children see her using her left hand. When actual demonstration was imperative, the father (right handed) lent his services.

Of the twelve children, only one showed definite preference for the left hand; he was permitted to establish left-handed habits. One child claimed to be "ambidextrous"; he used his left hand for writing and his right hand for eating; other habits were divided between the two hands. One of the children, Doris, now a diagnostician in a children's mental clinic, discovered that she is left-eyed. Upon analyzing her handedness she found that she holds tiny babies in her right arm, and uses her left hand to care for them. She also uses her left hand to hold the needle when sewing, and to hold the dish cloth when washing dishes. In all other activities she uses her right hand. Her penmanship is scarcely legible; she writes laboriously.

Queries. It may be probable that Doris is left-handed by nature. How would you account for no disturbance in her speech, or in nervous stability? In Doris' case, would the establishment of left-handed habits have been of greater advantage?

The definitely left-handed member of the family is now a college professor of economics. Would right-handed habits be of greater advantage to him?

SELECTED REFERENCES

1. Beeley, A. L. *Experimental Study in Left-Handedness*, Supplementary Educational Monographs, vol. 2, no. 2. University of Chicago Press, 1918.
2. Downey, J. E. "Types of Dextrality and Their Implications"; in *American Journal of Psychology*, vol. 38, pp. 317-67. (1927.)
3. Gordon, K. "Some Notes on the Mental Status of the Left-Handed"; in *Journal of Delinquency*, vol. 8, pp. 154-57. (1924.)
4. Judd, C. H. "Ambidexterity"; in Monroe's *Cyclopedia of Education*. The Macmillan Company, 1911.
5. Meyer, M. "Left-Handedness and Right-Handedness in Infancy"; in *Psychological Bulletin*, vol. 10, pp. 52-53. (1913.)
6. Mohlman, D. K. "A Preliminary Study of the Problems in the Training of the Non-Preferred Hand"; in *Journal of Educational Psychology*, vol. 14, pp. 215-30. (1923.)
7. Parson, B. S. *Left-Handedness*. The Macmillan Company, 1924. (This reference contains a bibliography of 23 pages.)
8. Rife, J. M. "Types of Dextrality"; in *Psychological Review*, vol. 29, pp. 474-80. (1922.)
9. Stevens, H. C., and Ducasse, C. J. "The Retina and Right-Handedness"; in *Psychological Review*, vol. 19, pp. 1-31. (1912.)
10. Strack, M. "Mirror-Writing and Left-Handedness"; in *Pedagogical Seminary*, vol. 2, pp. 236-44. (1893.)

CHAPTER VI

THE MENTALLY SUBNORMAL CHILD

Feeble-mind. "Alas, I want a suitable Companion, you are all lusty and strong, but I, as you see, am weak. I chuse therefore rather to come behind, lest by reason of my many Infirmities I should be both a Burden to myself and to you. I am, as I said, a man of a weak and feeble mind, and shall be offended and made weak at that which others can bear.... I shall like no unprofitable Questions.... I do not yet know all the Truth. I am a very ignorant Christian man. Sometimes if I hear some rejoice in the Lord, it troubles me because I cannot do so too. It is with me as it is with a weak man among the strong, or as with a sick man among the healthy, or as a Lamp despised. So that I know not what to do."

Great-Heart. "But Brother," said Mr. *Great-Heart*, "I have it in Commission to comfort the feeble-minded, and to support the weak. You must needs go along with us; we will wait for you, we will lend you our help, we will deny ourselves of some things both opinionative and practical for your sake, we will not enter into doubtful disputations before you, we will be made all things to you rather than you shall be left behind."

BUNYAN, *The Pilgrim's Progress*

1. *Hereditary and acquired feeble-mindedness*

Definitions. Mentally subnormal children are designated in many different ways: mental defectives, feeble-minded, subnormal, aments, mentally deficient, mentally inferior, abnormal, exceptional, atypical, backward, or retarded. While some of these terms are rightfully used to refer to the lower distribution of intelligence on the general intelligence scale, many of the terms are inexact, misleading, or too general to be descriptive.

For convenience, Terman has defined feeble-mindedness in terms of the intelligence quotient. All individuals, he says, who test below 70 I.Q. by the Stanford-Binet scale should be considered feeble-minded.¹ Of this group, those individuals

¹ Terman, L. M. *The Measurement of Intelligence*, p. 81. Houghton Mifflin Company, 1916.

included between 50 I.Q., and 70 I.Q., should be classed as morons; those between 20 and 25 I.Q., as imbeciles; and those below 20 or 25 I.Q., should be classed as idiots. This classification was adhered to quite pertinaciously for some time, especially by individuals untrained in the intricacies of mental diagnosis.

The main objections to the I.Q. classification of the feeble-minded are:¹

1. Except in perfectly obvious cases, no particular I.Q. has been found to be absolute proof of feeble-mindedness. The most careful investigators do not agree as to which point on the intelligence scale should distinguish the feeble-minded from the normal.
2. The I.Q. is relatively constant only for normal children; the fluctuations in I.Q. are greater for children at both extremes of the intellectual scale.
3. In itself, the I.Q. does not indicate the intelligence level or the diagnosis. A four-, an eight-, and a sixteen-year-old, each having an I.Q. of 50 have mental ages of two, four, and eight years respectively. The four-year-old would be classed as an idiot, on the basis of age level, but as an imbecile on the basis of I.Q. rating. Similar discrepancies in classification are evident in the other cases. Even though the I.Q.'s are the same, the mental levels and diagnoses are different.

No single definition for feeble-mindedness has yet been proposed that is unanimously acceptable. The substance of a definition in rather general use is as follows:²

A feeble-minded person is one who is incapable, because of mental defect existing from birth or from an early age, (a) of competing on equal terms with his normal fellows; or (b) of managing himself or his affairs with ordinary prudence.

¹ For further discussion in regard to the limitations of the I.Q., see Wallin, J. E. W., *Clinical and Abnormal Psychology*, p. 201 ff. Houghton Mifflin Company, 1927.

² Formulated by the Royal College of Physicians and Surgeons of London, and adopted by the English Royal Commission on Mental Deficiency. See Terman, *op. cit.*, pp. 80-81, for criticism of this definition.

Besides specifying an early age at which feeble-mindedness exists, this definition stresses social and industrial efficiency. Thus emotional, moral, and social traits as well as intellectual traits are involved. Accordingly, individuals may have intelligence quotients above 70, but because of inferior mental factors other than the intellectual, may be inefficient and may be classed as feeble-minded.

Causes. The causes of feeble-mindedness can be grouped into two general classes, namely, native and acquired. It has been estimated that about 90 per cent of the feeble-mindedness found among children is due to the first cause, and less than 10 per cent to the second.¹ Psychiatric texts give heredity as the most frequent cause of feeble-mindedness. Statistical studies found amentia or psychoneurosis present in family histories of from 40 per cent to 80 per cent of cases.² Some form of germ plasm defect was suggested by these studies. Feeble-mindedness due to innate or germinal conditions is heritable and may be predetermined even before the conception of the individual. Feeble-mindedness due to environmental factors acting directly upon the individual may have its inception either before, during, or after birth.

Heredity. The physiological structures determining feeble-mindedness are inherited just as any other physiological structure is inherited. Data on family histories of many feeble-minded children indicate that feeble-mindedness is inherited according to the general laws of inheritance. Charts based upon family histories show pictorially the heritable nature of feeble-mindedness. Goddard, in his extensive studies, showed 144 matings where both parents were

¹ Lapage, C. P. *Feeble-Mindedness in Children of School Age*, p. 179. University of Manchester Press, 1911.

² Conklin, E. S. *Principles of Abnormal Psychology*, pp. 400-01. Henry Holt and Company, 1927.

feeble-minded. Of the 482 children who lived beyond infancy and of whom information was obtainable, all but 6 were feeble-minded. In addition to recognizing feeble-mindedness as a condition inherited from feeble-mindedness,

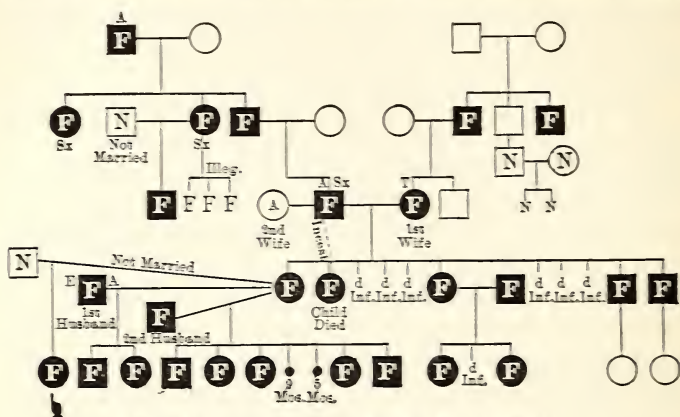


FIG. 31. HEREDITY AND FEEBLE-MINDEDNESS

The squares represent males, the circles females. The dark squares and circles indicate feeble-mindedness. A, alcoholic; E, epileptic; N, normal; d. inf., died in infancy. Note that when both parents are feeble-minded, all the children who grow up are feeble-minded also. (After Goddard.)

some authorities also consider a certain percentage of innate feeble-mindedness as due to neuropathic ancestry. That is, it is inherited from ancestors who suffered, not from feeble-mindedness, but from insanity, epilepsy, paralysis, apoplexy, and the like. In these cases it may be that a weakened constitution of the brain determined, by inheritance, the development into feeble-mindedness.

Acquired; before birth. Whether a condition of alcoholism, syphilis, or tuberculosis in parent or parents causes feeble-mindedness is a moot question. Animal experiments in alcoholization and lead poisoning¹ seem to offer evidence

¹ Wallin, J. E. W. *The Education of Handicapped Children*, pp. 294-98. Houghton Mifflin Company, 1924.

that toxins may affect the germ plasm and the embryo in such a way that they may seriously impair the progeny. However, the best authorities ¹ tend to hold that the vitiating factors of disease and habit are usually only indirectly responsible for feeble-mindedness, and only rarely directly responsible. When a predisposition to mental weakness exists, toxins have a predilection for finding the weak spot. In the absence of the predisposition, offspring may escape mental weakness. Parental inebriety is perhaps the result of mental deficiency rather than the cause; the same factors that caused parental inebriety (mental weakness, or at least instability) are heritable and may be evidenced in the offspring.

Abnormal conditions of mother during gestation. Disease or severe illness of the pregnant mother may occasionally be a contributory or even a determining factor for mental weakness in offspring. When some degree of germinal impairment is present, the condition of the mother may be sufficient to determine either mentally normal or subnormal offspring. The occurrence of sporadic cases of feeble-mindedness in an untainted family may occasionally be caused by the mother's physical condition.

Unfavorable or disturbed mental condition (excessive worry, insanity) of the prospective mother is of considerable less importance. Even children born of insane mothers show no mental weakness when the mother's insanity is of a temporary nature (nervous breakdown at trying time), and when hereditary predisposition is absent. Sudden frights or shocks of the pregnant mother do not have any influence at all upon the mental status of the offspring.

Acquired; at birth. Mental impairment can be, but very, very rarely is due to injury received at birth, either through

¹ See Tredgold, A. F. *Mental Deficiency (Amentia)*, pp. 39-50. William Woods, New York, 1914.

protracted or through instrumental delivery. The many cases of mental deficiency attributed to birth injuries are usually attempts to conceal the actual and more serious causes.

Post-natal causes. The number of cases of feeble-mindedness due solely to factors occurring after birth is smaller than the number due to factors operating before birth. Factors commonly attributed to post-natal causes for feeble-mindedness, are, as a rule, contributory, or exciting influences only. When a predisposition is present many factors can be responsible for crystallizing dormant tendencies.

1. *Head injuries* in early infancy, while possible, rarely are responsible for feeble-mindedness. When severe head injury takes place it is probable that a rupture of blood vessels follows, leading to cortical laceration with subsequent destruction of a *localized* area of brain tissue. This usually causes epilepsy or paralysis rather than general mental weakness.

2. *Acute infectious diseases*, such as scarlet fever, diphtheria, measles, whooping-cough, etc., occurring in infancy, can produce cerebral lesion. Sometimes the lesion is cortical, but in most cases there is a direct poisoning of the brain cells and general feeble-mindedness results. It must be emphasized that the number of cases is very small.

3. *Convulsions* of various kinds are the most frequently alleged causes of feeble-mindedness. Here again, cause and effect are often interchanged. In the great majority of cases where convulsions in early life are associated with mental weakness, both conditions are manifestations of tainted ancestry. However, it is also evident that severe and frequent convulsions or fits before brain development is complete may prevent normal mental development. This is inferred from the known degrading effects of epileptic convulsions in later life.

4. *Undernourishment.* Since the physical health and development of the growing child is so dependent upon proper food, rest, light, and warmth, it might be assumed that deprivation of these essentials will prevent mental development. Adverse physical conditions may retard mental development just as any serious ill-health or disease may temporarily retard, yet, in the absence of hereditary predisposition, the mind is not as a rule permanently impaired. A few cases in which developmental arrears were never made up are recorded. Rickets, sometimes accompanied by mental weakness, is not considered the causal factor of the mental condition. Shock or fright have never caused mental weakness in a normal child, but they may precipitate it in cases where hereditary predispositions obtain.

2. *Psychological characteristics of the feeble-minded*

Brains of feeble-minded individuals. In size, weight, and general appearance the brain of mild feeble-minded individuals may not show gross differences from the normal brain. As a rule, some sign of abnormal condition is present. In more pronounced degrees of mental deficiency, differences are usually obvious. The brain of an idiot, or even of a low or of a medium-grade imbecile, does not look like the normal brain even to the naked eye. Usually it is smaller (sometimes larger), underweight by several hundred grams; in texture it is either unusually soft or unusually dense, and the convolutions are often irregular and of markedly diminished complexity.

The essential basis of feeble-mindedness is an imperfect or arrested development of the cerebral neurones. In comparison with the nerve cells of a normal brain, those of the feeble-minded are characterized in three ways: (1) numerical deficiency; (2) irregular arrangement, and (3) imperfect development. The amount to which these characteristics

differ from normalcy is directly proportional to the degree of mental deficiency of the individual.

Sensation: Taste. Even at birth the normal child can hear, feel, see,¹ and probably smell.² The senses of the feeble-minded often show impairment. In mild cases of feeble-mindedness there is usually no marked impairment in the sense of taste, although there may not be the delicacy of taste that is found in the normal individual, but in the more pronounced cases there is often an extreme defect of taste. For instance, some idiots will munch sugar, quinine, or soap quite indifferently and without the slightest indication that they distinguish one from the other. Some will eat and drink anything at hand, wood, grass, earth, or even most putrid offal. It has been found ³ that the taste of imbeciles, even as babies, is distinctly defective.

Smell. Feeble-minded individuals of higher grades are able to distinguish most odors, but they usually show a lack of delicacy of discrimination. In the cases of lower grades there often seems to be a complete absence of the sense of smell. Many idiots will smell most filthy odors without any sign of repugnance. Some can sniff strong ammonia without any reflex movements.

Vision. In milder degrees of feeble-mindedness, visual defects consist chiefly in an inability to discriminate between the slighter differences of form, size, or color. In more severe cases these defects become more and more marked. In the low-grade imbecile and the idiot perception of color often seems limited to the recognition of red. Color-blindness, however, does not seem to be more common among the mentally deficient than among normal persons.

¹ Peterson, F. *Journal of Nervous and Mental Disease*, February, 1912.

² Preyer, W. *Mental Development in the Child*. D. Appleton and Company, 1901.

³ Thiemich, *Deutsche Med. Wochenschr.*, vol. 26, p. 34. (1900.)

Hearing. As in the case of the other sensations, hearing among the higher grade feeble-minded is usually not marked by gross deficiency, although as a rule it is neither so acute nor as discriminative as that of a normal individual. The frequent anomalies of the external ear rarely interfere with hearing. Complete deafness is not common in the mental defective. Some idiots and imbeciles will not pay the slightest attention to questions or noises of many kinds, and it is often thought that they are deaf. This is due to lack of interest and attention, as a rule, for they will turn at once upon the rattle of a spoon and a plate.

Cutaneous senses. Again, in the milder cases of feeble-mindedness the cutaneous senses function, but not with the finer gradations shown by normal individuals. Imbeciles and idiots show great impairment of these senses. Idiots often sit under the hottest sun or are exposed in the coldest winter weather without showing any discomfort. Their inability to feel pain is often a marked characteristic. Many will pull out their hair, teeth, or toenails, or injure themselves severely without showing indications of pain.

Other sensations. In the feeble-minded, sensations from muscles, tendons, and joints are defective, as a rule, in proportion to the degree of defectiveness of the individuals. In tests requiring the discrimination of weights by placing them upon the palm of the hand, the mentally deficient child is usually decidedly inferior to the normal. In lower grades of defectives the test is impossible. *Organic* sensations, such as impressions from internal organs, thirst, hunger, and the sexual instincts are experienced by the higher-grade feeble-minded; the last are often inordinately developed. The lower-grade idiots do not experience the painful sensations accompanying diseases, and would die of starvation if not fed. Often in these individuals the instinct of sucking is absent at birth. Some idiots gluttonously and voraciously devour almost anything at hand.

Perception. The process of perception, sensing with meaning, is perhaps the first of the mental processes, beyond sensation, to develop. The various sensory areas are connected so closely with higher-level areas, by an intricate system of nerve fibers, that when a sensation passes into consciousness it is in the form of a perception. That is, it is a sensation plus experience; it is a cognition of the presented and the represented. It is doubtful whether we can ever have a pure sensation devoid of any association. The intricate system of association fibers causes all sensations to be associated with many other sensations and with higher levels, so that a complex mental picture is aroused with every sense stimulation.

In the case of the feeble-minded, perception, perhaps, is simple, rudimentary, or imperfect, not so much from imperfect sensation proper, but due to a simpler system of association fibers. Whether this is actually the case has not yet been proved because entirely satisfactory tests for perception have not been devised.

Attention. The act of attention consists in focusing consciousness upon a single stimulus or set of stimuli to the relative exclusion of all other stimuli. When the nature of the stimulus is such that it focuses consciousness without any mental effort on the individual's part, attention is said to be involuntary; when the stimulus has no compelling power of its own, the focusing of consciousness requires volitional effort, and attention is said to be voluntary. Involuntary attention may be dependent upon objective or upon subjective factors. That is, the stimulus may, by its very nature, force itself upon consciousness. As a rule, sudden, intense, novel, moving, changing, recurrent, and terminal stimuli are attended to involuntarily by all individuals. Factors of interest, habit, and attitude may condition some individuals so that they will attend involuntarily to

some stimuli that other individuals usually give voluntary attention to only. Thus, a shrill whistle, a flickering light, and a speeding locomotive receive the involuntary attention of most individuals, while a faint odor, a certain voice, or a particular name will attract the involuntary attention of individuals who for some reasons have conditioned themselves to these stimuli.

In the lowest types of idiots even involuntary attention is defective; it may be too fixed upon certain stimuli or it may not be capable of fixation at all. This may be due to imperfect perception and to an inacuteness of sensations. In many cases of feeble-mindedness, involuntary attention is impaired because of diminished cerebral excitability — brain inertia. Such individuals are dull and lethargic. They seem to be unaware of anything happening around them, and usually gaze vacantly in front of themselves. Only after being addressed several times do they respond.

A large number of feeble-minded are incapable of voluntary attention. They differ from those lacking involuntary attention in that they are very active and restless, and are attracted by so many things about them that sustained attention is impossible. Every sight and sound distracts these individuals. A defective power of coördination and control seems to be the cause of this distractibility. Defective attention is characteristic of normal infancy. In the feeble-minded this phase of development of the normal child persists as so many other child phases persist throughout life. In a large number of tests ¹ given to feeble-minded of mental ages six, eight, and ten, the conclusions reached were that the fundamental differences between these mental ages is a matter of attention, and that it is the psychological process in which the levels of intelligence differ.

¹ Ordahl, E. O., and Ordahl, G. "Qualitative Differences Between Levels of Intelligence in Feeble-Minded Children"; in *Journal of Psycho-Asthenics*, Monograph Supplements, vol. 1, no. 2. (1915.)

Imagination. Imagination, the mental picturing without a direct sensory stimulus, is present in the feeble-minded as is shown by their reverie and day-dreaming. The feeble-minded characterized by instability often experience vivid imagination in the form of delusions. That some have constructive imagination is shown by their skill in mechanical inventions and drawing, as well as by their ability in inventing plausible lies and planning mischief of all sorts.

Tests for distinctness of children's imagery in relation to intelligence ¹ found that the correlations were very low. Other investigations, too, lead to the conclusion that children who have the clearest types of imagination are not necessarily brightest.

Imagination, however, is dependent upon many mental processes — sensation, perception, attention, and memory, as well as a facility and complexity of association. It may be reasonable to suppose that defects which the feeble-minded often have in any of these processes would impair the process of imagination. The difficulty of abstracting and measuring the faculty of imagination in isolation of other mental processes, has been an obstacle in reaching definite conclusions. Tredgold ² says that on the whole there seems to be a decided defect in the faculty of imagination in the feeble-minded; "if mentally defective school-children be watched drawing, brick-laying, or pattern-making, it will generally be found that they follow the same stereotyped plan, and that they do not evince a fraction of the originality shown by the normal child. In the imbeciles and idiots the deficiency is much more pronounced."

Association. The physical basis for association is, per-

¹ Carey, N. "Factors in the Mental Processes of School Children"; part i, "Visual and Auditory Imagery"; in *British Journal of Psychology*, vol. 7, pp. 453-90. (1915.)

² Tredgold, *op. cit.*, pp. 114-15.

haps, the intricate system of association fibers in the cortex which connect the various cell layers. In the feeble-minded there is a numerical deficiency of these fibers, and the deficiency is in proportion to the degree of mental deficiency. It is reasonable to suppose that the mental process of association is more restricted in the feeble-minded child. That this is the case has been found by several investigators. In free word-association tests,¹ in which the child is asked to respond to stimulus words by the very first words that come to mind, it was found that feeble-minded children do not reach the degree of efficiency attained by normal children. It was also found that they respond with a smaller number of favorite responses² (which the investigator interprets as being indicative of mental inferiority).

Memory. Memory consists primarily of retention and recall. Recall is dependent upon association; the stronger the bonds linking facts the more readily can one be drawn to the surface of consciousness by the other. The physiological condition underlying retention is not known; it is thought that differences in the innate constitution of the brain cells determine differences in retentiveness (aside from conditions of the stimuli). A good memory is also dependent upon attention, will-power, and judgment. Rote memory does not depend upon judgment.

The deficiency of association found in feeble-minded would impair good memory. Tests have found³ that there is quite a degree of correlation between intelligence and memory, but it falls far short of a perfect correlation. Judgment, essen-

¹ Norsworthy, N. *The Psychology of Mentally Deficient Children*. New York, 1906.

² Römer, F. "Associationsversuche an geistig Zurückgebliebenen Kindern"; in *Fortschritte der Psychologie und ihrer Anwendungen*, vol. 3, pp. 43-101. (1914.)

³ Brown, W. "Some Experimental Results in the Correlation of Mental Abilities"; in *British Journal of Psychology*, vol. 3, pp. 269-322. (1910.)

tial for a serviceable memory, is not as highly developed in the feeble-minded. In memory tests not requiring judgment, the feeble-minded often do fairly well; in tests for serviceable memory, they do poorly.

Some feeble-minded are characterized by a remarkable ability of remembering dates, faces, names, numbers, insignificant occurrences, of repeating poetry, and so forth. Usually such memory is particular rather than general; in the feeble-minded general memory is decidedly poor.

Reasoning and judgment. These highest mental processes are the criteria of intelligence. That higher-grade feeble-minded children are incapable of higher or more complicated types of reasoning is constantly shown in their performance on intelligence tests. Imbeciles are not incapable of reasoning, but they reason as very small children do; their reasoning is very simple and often faulty. With the majority of idiots reasoning is entirely absent. Judgment, the capstone of reasoning, is not encountered in any type of feeble-minded.

An interesting test in reasoning was tried ¹ with two children; a feeble-minded of a higher order and an imbecile. During a pouring rain an umbrella was placed near a door and the children were told to bring a certain flower out of the garden. The feeble-minded child opened the door, saw the rain coming down in torrents, then, after a pause, picked up and opened the umbrella. The imbecile started out in the rain and would have been drenched through had he not been called back. When he was given the umbrella, he had enough sense to open it before going out.

Will. Willing is dependent upon the presence of a motor idea which must attain such dominance that it culminates in action. Often the idea tends to action that is distasteful or disadvantageous to the individual and must be reënforced by

¹ Tredgold, *op. cit.*, p. 117.

other ideas, as those of duty, honor, or ultimate advantage. Attention and reason are necessary in reënforcing the motor idea. Often greater will is required to inhibit overt action. Thus when angry and wanting to strike (overt action), it often requires great will power not to strike (covert action).

Since will is dependent upon ideation, attention, and reasoning, factors not strong in the feeble-minded, it is only natural that the feeble-minded also have weak will power. Ample evidence of this is seen in their inability to direct their affairs and in their high degree of suggestibility (readiness to accept another's will as one's own). The large numbers of feeble-minded dependent upon charity, and the large numbers that have been prey of vicious and evil individuals, show the characteristics of weak wills.

Emotion. All mental processes are accompanied by a "feeling tone." This feeling tone is of a pleasant or of an unpleasant nature. With the development of intellectual processes these simple feeling tones become complex and are designated emotions. Emotions include mental states known as anger, fear, joy, hate, sorrow, despair, envy, shame, and the like.

In so far as emotion is associated with intellectual development it is proportionate to the general intelligence of the individual. In lowest-grade idiots there seems to be neither feeling nor emotion. The higher-grade idiots show signs of pleasant and unpleasant feelings. Imbeciles show feelings of fear, anger, grief, surprise, affection, hate, and sometimes envy and jealousy. The feeble-minded of still higher grade show evidence of far more complex emotions, but rarely do they have these emotions in the same intensity as normal individuals, and usually they are of a transient nature. Violent demonstrations often accompanying mental states of the feeble-minded are not measures of emotional intensity.

3. *Physical condition of the feeble-minded*

Height and weight. Physically, the feeble-minded approach the norms much nearer than in mental development. A comparison of physical-growth curves plotted for measurements of feeble-minded children with the growth curves of

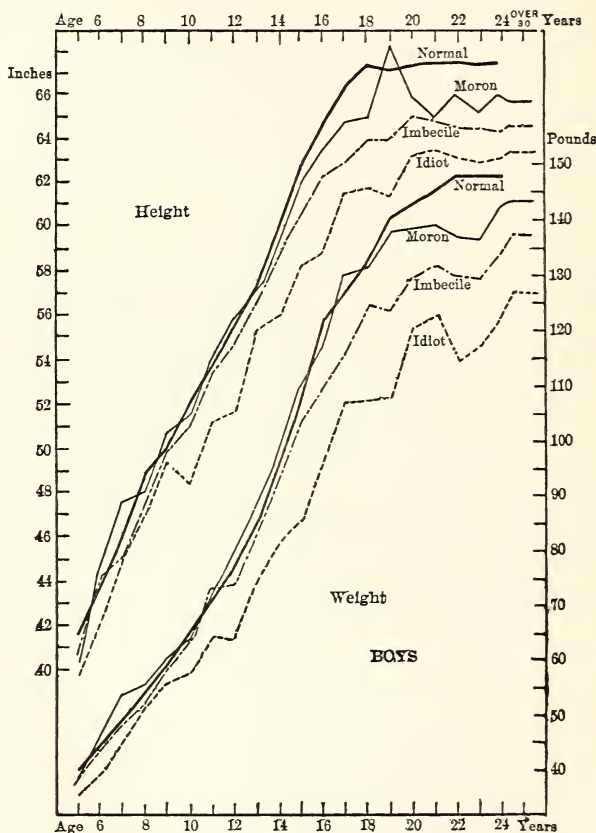


FIG. 32. HEIGHT AND WEIGHT OF FEEBLE-MINDED BOYS
In comparison with normal boys. (After Goddard.)

average children, chosen at random, shows that the former are shorter and lighter than the latter. These differences increase with the increase in degree of mental defectiveness. Morons are slightly below the average for normals, imbeciles are below morons, and idiots are below imbeciles. The close

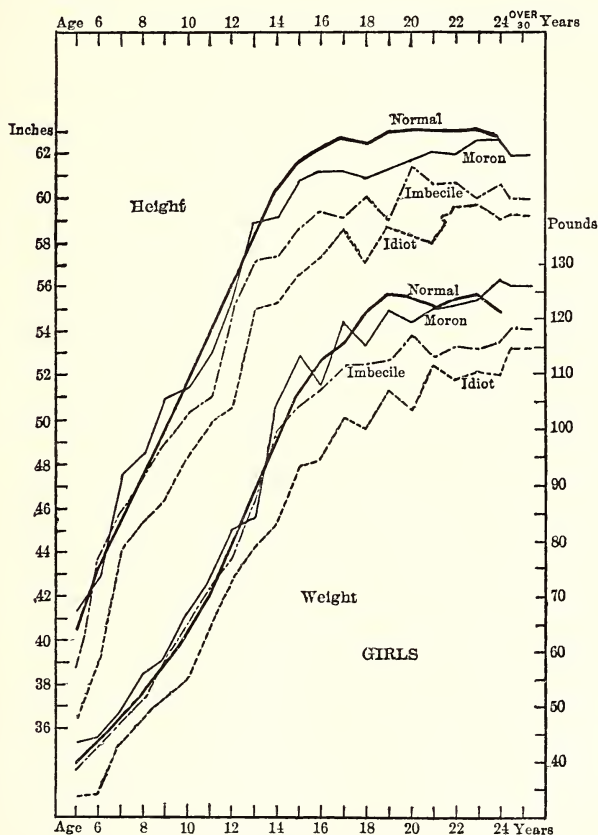


FIG. 33. HEIGHT AND WEIGHT OF FEEBLE-MINDED GIRLS
In comparison with normal girls. (After Goddard.)

approximation of averages indicates that the overlapping probably is very great.

Goddard's ¹ findings (see accompanying charts) in a study of the inmates of nineteen institutions for feeble-minded, including over 10,000 cases (4723 boys; 5923 girls), bring out these points quite definitely. In his general conclusions he summarized his findings as follows:

We have a remarkable correlation between physical growth and mental development.

The low grade (idiot) has not only a disturbed brain function, but his entire organism is disarranged and growth processes are upset.

In the imbecile the same is true, but to a less extent. In the moron we have the interesting phenomenon of practically normal growth during the immature years, but an arrest of growth earlier than in normals.

All defectives are heavier at birth than normals. This would once have been thought to be correlated with the defect through greater difficulty of birth necessitating the use of instruments, with resulting injury. But in the light of our findings in heredity this is seen to be without force.

Sex differences are less and less marked as we go down the grades of defect.

Other physical measurements of feeble-minded children, while not yet establishing an inferiority, seem to indicate lower averages. Cranial measurements, vital lung capacity, and sitting height would, if the feeble-minded children are developed in proportion, necessarily be below normal. The overlapping would again be large.

Stigmata of degeneration. The feeble-minded have more stigmata of degeneration. By this is meant a physical anomaly; a congenitally deformed or misshapen part of the anatomy. While it is true that normal children have stig-

¹ Goddard, H. H. "The Height and Weight of Feeble-Minded Children in American Institutions"; in *Journal of Nervous and Mental Disease*, vol. 34, no. 4, pp. 211-35. (April, 1912.)

mata, still, mental defectives have stigmata far more often. Moreover, mental defectives often have several pronounced forms. In number and severity they are in proportion to the degree of defectiveness shown by the individual. Thus, idiots have more and more exaggerated stigmata than imbeciles, and far more than morons.

Any portion of the anatomy may be malformed to the degree of being classified as a stigma. The more common stigmata found among the mentally defective are asymmetry of the head, peculiar formation of the head, an extremely small or an extremely large head, extremely sloping forehead, receding chin, saddle-shaped hard palate, and V-shaped palate — that is, narrowed to a V as it comes forward. In this case the front teeth are overcrowded and protruded. The most thorough investigators of the palate found that its malformation is about as common among normal as among mentally deficient. Cleft palate and hare-lip, likewise, do not seem to be any more frequent among the mentally deficient, and are symptomatic only when accompanied by other irregularities.

Irregularity of the lower jaw and poor teeth are common in mental defectives; a good set of teeth is rarely encountered among them. The teeth appear late, and often the “wisdom teeth” do not appear at all. Supernumerary digits, absence of one or more digits, webbed fingers, and “lobster hand” (cases where the four fingers are not differentiated, but are grown together into a shapeless mass) are found frequently.

Stigmata of the ear and eye. A great variety of malformations appear in the special-sense organs.¹ In the case of ears the right is often different from the left. Sometimes only one ear is malformed. The accompanying figure (Fig. 34) shows some of the common types of ear malformations.

¹ Lapage, C. P. *Feeble-Mindedness in Children of School Age*. Manchester University Press, 1911.

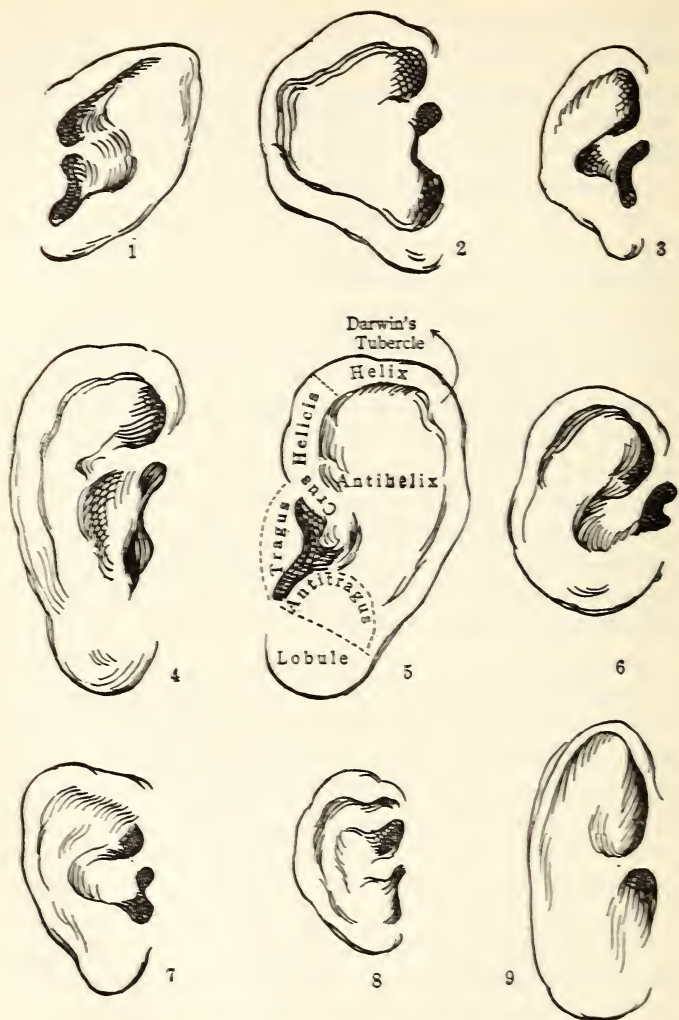


FIG. 34. COMMON TYPES OF EAR MALFORMATIONS

(After Lapage.)

(See key at foot of page 201.)

In the case of eyes the following defects are common: cross-eyedness, eyes of different color or size, one eye set higher in the face than the other, and a trembling of the eyes in which there is a very rapid movement from side to side, especially if the child tries to turn the eyes in any one direction. A crooked or irregular mouth, loose and flabby lips, a nose showing deviations from a mere button to an exceedingly large, broad or irregular organ are also found.

It must be emphasized again that while normal children often have stigmata, feeble-minded children show them more often, and show a combination of two or three much more often than do normal children.

Other peculiarities. Defective expression is very common, although appearances are often deceptive. Creasing of the forehead, twitchings of the mouth, and rolling of the eyes are common. The chief indication of mental deficiency from the expression is the lack of control of the motile features.

Motor ability. In regard to motor control, the feeble-minded are inferior to the normal. Tests in grip, speed of voluntary movement, and muscular coördination all show feeble-minded children to be below normal. Some authorities claim that there is a greater tendency toward left-handedness in the feeble-minded, and that the two hands are more nearly alike. They often have awkward and shambling gait, and have difficulty in learning to hop and to

Key to Figure 34:

1. Defective ear, showing deficiency of lobule, absence of fossæ, maldevelopment of the helix, and a tendency to reversion to the pointed ear.
2. General deformities in shape, but chiefly remarkable as showing tendency to lobulation.
3. General smallness, with absence of the lobule.
4. Large protruding ear, with a heavy lobule.
5. Normal ear. (Keith's *Embryology*.)
6. Deficient lobule, deficient helix, fusion of the helix, antihelix, and antitragus, and a general rounding.
7. Deficiency of the upper part of the pinna.
8. Smallness, general rounding and crumpling. Upper part of pinna overhanging.
9. Shallowness or absence of the fossæ, deficiency of the tragus and antitragus, and general maldevelopment.

skip, to climb or descend stairs, or to perform any action that requires a coördination of movement.

Movement. In the normal child pathways are formed within the cerebrum so that the motor ganglia acquire two connections; one bringing them into relation with the sensory areas of the brain, the other bringing them into relation with the higher levels concerned in ideation and volition. In the feeble-minded, various anomalies of movement may occur as a result of imperfect development of the motor cells themselves or in the connecting pathways. Imperfect development of the motor cells may be evidenced by diminished excitability of the cells. This results in deficient quantity of movement. This condition is most common in the idiot grade, but is also seen in imbeciles and higher grades of feeble-mindedness. In the more pronounced cases it is quite noticeable from birth. The child never cries, sucks, or looks about him like a normal child. In volitional response, action may be tardy not because of deliberation, but because the cerebral cells are lethargic and of low excitability and the establishment of pathways is difficult.

In some types there is an opposite condition of hyper-excitability of the nervous tissue and the ready, though often faulty, establishment of pathways. This results in a ceaseless activity of the individual. This is noticeable even shortly after birth, and the remark that the "child never sleeps" is often made. This is an exaggeration, of course, but sleep is very light and easily disturbed, and on the volitional side action is impulsive, occurring almost immediately upon the presentation of an idea. Excessive movements are common in feeble-minded cases, but are not characteristic of feeble-mindedness for they are also common in the neurotic child.

Speech. The speech of feeble-minded children is of such importance that it can be used in clinical diagnosis to the

greatest advantage. Speech impediments are commonly encountered in the mentally deficient, and these increase with the decrease of mentality. Aside from the mechanism of speech, the language of defectives is, of course, the most important means of determining the general capacity and nature of intelligence.

A normal child should learn to walk and to talk between the ages of nine and fifteen months. Sometimes diseases may retard these developments, and occasionally normal children, evidently without any cause, are very late in learning to talk. Delayed development of speech does not mean that the child is mentally deficient. It means that some parts of the brain, either the centers of the afferent or efferent pathways, are slow to take up their functions, and that there is something delaying these developmental processes.

When not due to environmental or psychological factors, a delay in development of speech may be due to one of three specific conditions: (1) underdevelopment of perception centers and unopened receptive paths; (2) underdevelopment of cortical centers and outgoing pathways; or (3) deficient intelligence. As a rule the longer speech is delayed the greater is the possibility of deficient intelligence. The following table¹ shows the relation of the degree of mentality and speech defects to the ages of learning to walk and to talk.

TABLE XXII. SHOWING THE AVERAGE AGES AT WHICH FIVE DIFFERENT CLASSES OF FEEBLE-MINDED CHILDREN COMMENCED TO WALK AND TALK

Good, Medium, and Bad refer to the mental capacity as estimated by the teacher. *Defective speech* comprises consonantal anomalies (excluding *f* for *th*), lipping and marked stammering.

Classification of case	Average age walk	Average age talk
61 cases classed as <i>Good</i>	1.5 years	1.8 years
44 cases classed as <i>Medium</i>	1.8	2.0
50 cases classed as <i>Bad</i>	2.2	3.5
88 cases with good speech	1.6	1.9
64 cases with defective speech	2.2	3.2

¹ Lapage, C. P. *Feeble-Mindedness in Children of School Age*, p. 80. Manchester University Press, 1911.

A study of the table will show that the greater the degree of mental deficiency, the later the child will learn to walk and to talk. That lateness in learning to talk is a result of mental deficiency rather than a cause is to be inferred from the general structure and function of the central nervous system.

Defects of pronunciation. These are very common in even the higher grade of the feeble-minded, and are attributable to imperfect coördination of the speech mechanism or to an inability to perceive and to discriminate between slight differences in auditory sensations. Impairment of the vowel sounds is not usually encountered; the imperfections commonly occur in the consonants. The following table lists the consonantal defects of the feeble-minded child in the order of frequency found by the investigator. The sounds commonly substituted are also shown.

TABLE XXIII. CONSONANTAL DEFECTS OF THE FEEBLE-MINDED ¹

	Consonant	Commonly replaced by	As in
Most frequently defective	1. Th	F or T	<i>Fumb, teef, mouf, tank</i>
	2. R	Y or L	<i>Yabbit or labbit, pallot.</i>
	3. Y	R or L	<i>Lellow.</i>
	4. S	T or Ts	<i>Tissors, tsoap.</i>
	5. G	D	<i>Dun, dod, sudar.</i>
	6. Ng	D	<i>Strind.</i>
	7. Sh	Tsh or T	<i>Tsheep, Tshudar, tirt.</i>
	8. K	T	<i>Tat, toat blat.</i>
	9. V	B	<i>Belbet.</i>
	10. L	Y	<i>Yeg, yad.</i>
Less frequently defective	11. F	T	<i>Tottee.</i>
	12. Z	Dse	<i>Nodse.</i>
	13. W	M (or omitted)	<i>Mindow.</i>
	14. P	T or D	<i>Dader</i>
	15. N	D	<i>Dose, ped, peddy.</i>
	16. D	T	<i>Toor, lat.</i>
	17. T	D	<i>Deef (teeth)</i>
	18. M	B	<i>Jab.</i>
	19. B	P	<i>Pag.</i>

¹ Compiled from Lapage, *op. cit.*

Other disorders of speech due chiefly to intellectual defects include the misapplication of words, the inability to recall appropriate words, and imperfections in the grammatical arrangement of sentences. Slurred, hesitating, or indistinct speech is common. Occasionally, as in the case of idiot savants, a feeble-minded individual has an extraordinary faculty for repeating sounds with extreme accuracy. His precision in enunciation enables him to repeat poetry or prose in an entirely unknown tongue.

Some feeble-minded children, although they can and often do express ideas in their own words, have a tendency to repeat questions put to them instead of answering the question. This is known as *echolalia*. In some cases the tone and manner of the questioner is copied with remarkable exactitude. Sometimes, after several repetitions of the question have been made, the child is able to answer it. When the child is asked "What is your name?" he is merely repetitive although he is able to speak quite sensibly. This condition has been explained¹ as possibly being due to the consciousness being so swamped or occupied that auditory sounds reach only a subconscious motor-idea center, and are then immediately translated into speech. Fright, anxiety, or emotional disturbances caused by the presence of a stranger, unaccustomed surroundings, or tense situations are sufficient to bring on this condition. There is a short-circuiting of the nerve current.

A condition of "filthy speech," known as *coprolalia*, is present in some feeble-minded individuals. This usually takes the form of more or less sudden outbursts of language of the most vile and disgusting character. This condition is encountered even in individuals brought up in cultured and refined homes.

¹ Tredgold, A. F. *Mental Deficiency; Amentia*, p. 134. William Wood and Company, New York, 1914.

4. *Training of the feeble-minded*

Avenues of approach. The various compulsory school-attendance laws passed in recent years have kept in the public schools large numbers of feeble-minded children who are unable to do the work scheduled for normal children. In many schools special classes, or opportunity rooms, have been organized with curricula especially suited for the feeble-minded children. The aim of these schools is to teach these children only what they are capable of learning that will directly help them to be self-controlled and self-supporting citizens. Inskeep,¹ in commenting upon the aims in the training of feeble-minded children, says that the emphasis should not be upon the three R's but rather upon the "three H's" — hand, head, and heart; the hands should be trained, and should be guided by a thinking head, and controlled by disciplined emotions. Things that are self-evident to normal children or that are learned incidentally by them must be taught to feeble-minded children. For the feeble-minded various modes of presentation utilizing many avenues of approach and a great deal of drill are necessary in order to establish permanent habits and to develop skill. Inskeep emphasizes curriculum content and games that will develop attention, concentration, and judgment; she suggests projects that will introduce life situations where all of the child's interests center for the time being around a desirable piece of knowledge.

The objectives of the education for the feeble-minded (not totally helpless) are the same, but at a lower level, as the objectives of education as a whole, namely:² health, command of fundamental processes, worthy home-membership,

¹ Inskeep, A. D. *Teaching Dull and Retarded Children*, p. 2. The Macmillan Company, 1926.

² *Cardinal Principles of Secondary Education*, pp. 10-11. Department of the Interior, Bureau of Education, Bulletin no. 35. Washington, 1918.

vocation, citizenship, worthy use of leisure, and ethical character. Feeble-minded as well as normal individuals must develop knowledge, interests, ideals, habits, and skills in order to play a successful rôle in the betterment of society. The feeble-minded's knowledge will be limited, his interests naïve, his ideals crude, his habits simple, and his skill mechanical, yet they must be developed to the feeble-minded's highest possible level. An analysis of the activities of the feeble-minded shows that for the purpose of determining the main objectives of education we cannot make distinctions for various levels of intelligence. The analysis of the activities of the individual in a democracy as outlined by a government commission¹ holds good in analyzing the activities of the feeble-minded:

Normally he is a member of a family, of a vocational group, and of various civic groups, and by virtue of these relationships he is called upon to engage in activities that enrich the family life, to render important vocational services to his fellows, and to promote the common welfare. It follows, therefore, that worthy home-membership, vocation, and citizenship, demand attention as three of the leading objectives.

Aside from the immediate discharge of these specific duties, every individual should have a margin of time for the cultivation of personal and social interests. This leisure, if worthily used, will recreate his powers and enlarge and enrich life, thereby making him better able to meet his responsibilities. The unworthy use of leisure impairs health, disrupts home life, lessens vocational efficiency, and destroys civic-mindedness. The tendency in industrial life, aided by legislation, is to decrease the working hours of large groups of people. While shortened hours tend to lessen the harmful reactions that arise from prolonged strain, they increase, if possible, the importance of preparation for leisure. In view of these considerations, education for the worthy use of leisure is of increasing importance as an objective.

To discharge the duties of life and to benefit from leisure, one

¹ *Cardinal Principles of Secondary Education*, pp. 9-10. Department of the Interior, Bureau of Education, Bulletin no. 35. Washington, 1918.

must have good health. The health of the individual is essential also to the vitality of the race and to the defense of the Nation. Health education is, therefore, fundamental.

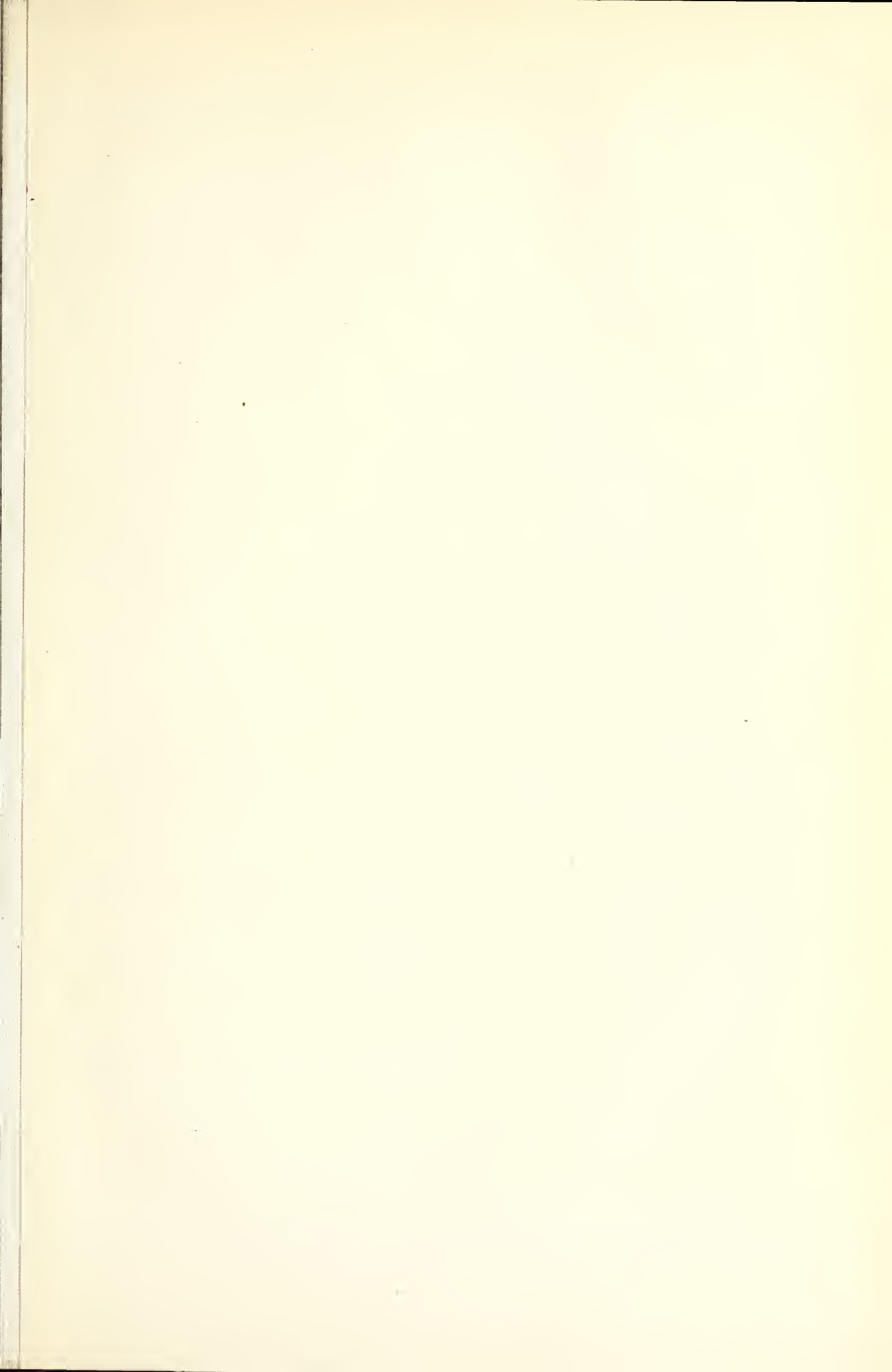
There are various processes, such as reading, writing, arithmetical computations, and oral and written expression, that are needed as tools in the affairs of life. Consequently, command of these fundamental processes, while not an end in itself, is nevertheless an indispensable objective.

And, finally, the realization of the objectives already named is dependent upon ethical character, that is, upon conduct founded upon right principles, clearly perceived and loyally adhered to. Good citizenship, vocational excellence, and the worthy use of leisure go hand in hand with ethical character; they are at once the fruits of sterling character and the channels through which such character is developed and made manifest. On the one hand, character is meaningless apart from the will to discharge the duties of life, and, on the other hand, there is no guarantee that these duties will be rightly discharged unless principles are substituted for impulses, however well-intentioned such impulses may be. Consequently ethical character is at once involved in all the other objectives and at the same time requires specific consideration in any program of national education.

The training of the feeble-minded must develop habits and skills, establish attitudes and interests compatible with the individual's intellectual level and of immediate interest and value to him. The teacher's methods must, for the greater part, be simpler, and involve more concrete and illustrative material; drill and project teaching are adaptable methods. The training of the feeble-minded may be summarized as shown on page 209.

The accompanying graph (between pages 208-209) is planned for the slightly retarded children. Anderson¹ presents an outline for various types of work for special classes, correlated with Tredgold's and Goddard's classifications of feeble-minded.

¹ From Anderson's *Education of Defectives in the Public Schools*. Copyright, 1917, by World Book Company, Publishers, Yonkers-on-Hudson, New York.



TYPE OF WORK IN SPECIAL CLASSES FOR THE FEEBLE-MINDED

TREDGOLD	GODDARD	TYPE OF WORK FOR DEFECTIVES
<p>An idiot is so deeply defective from birth or from an early age that he is unable to guard himself against common physical dangers.</p>	<p><i>Idiot</i> Low (under 1 year). 1. Helpless. 2. Can walk. 3. Has voluntary regard. Middle (1 year). 1. Feeds self. 2. Eats everything. High (2 years). Eats discriminately.</p>	<p>There are practically no idiots in the special classes for defectives.</p>
<p>An imbecile is one who, by reason of mental defect existing from birth or from early age, is incapable of earning his own living, but is capable of guarding himself against common physical dangers.</p>	<p><i>Imbecile</i> Low (3 and 4 years). 3 years. No work. Plays a little. 4 years. Tries to help.</p> <p>Middle (5 years). Only simplest tasks.</p> <p>High (6 and 7 years). Tasks of short duration. Washes dishes. Dusts.</p>	<p>The children of this grade are taught the following: 1. Personal cleanliness. 2. Sense-training. 3. Manual training which consists of the crudest kind of work involving the large muscles. This group shows a desire to make things. 4. Exercises of practical life, which consist of sweeping, dusting, scrubbing, etc. 5. Physical training, which consists of rhythmic work of all kinds, such as skipping, running, simplest folk-dancing, apparatus work in gymnasium, and rhythmic games. 6. Music. Rote songs which have action 7. Speech-training.</p> <p><i>Note.</i> While the results with this group are crude, the improvement in children is marked.</p> <p>This group is organized on the departmental plan.</p> <p><i>The Kitchen</i> The children wash dishes, wash and iron the simplest pieces, clean the smaller stoves, polish zinc counter, help prepare the lunch.</p> <p><i>The Shop</i> These children make simple problems which are also useful.</p> <p><i>The Gymnasium</i> Rhythm work of all kinds, command and imitative work, dumb-bells and wand drills, apparatus work, folk-dancing, and games.</p> <p><i>Music</i> Rote songs.</p> <p><i>Manual Training</i> Basketry, brush-making, rug-making, sewing chair-caning.</p>

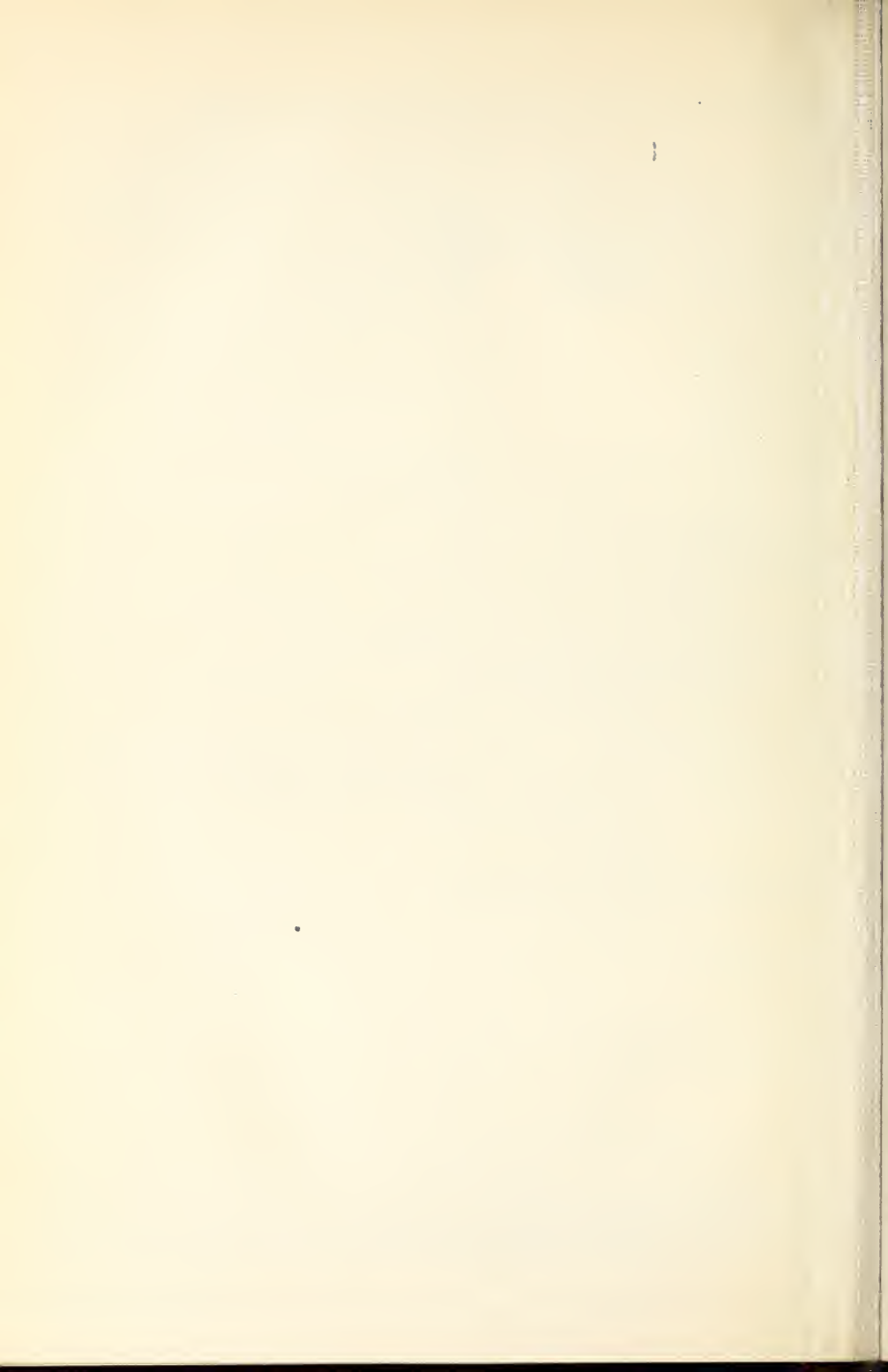
¹ From Anderson's *Education of Defectives in the Public Schools*. Copyright, 1917, by World Book Company.
The children are promoted from class to class as they demonstrate their ability to do the next higher-grade work, in which class are children of varied mentality, but all trained to do high-class work.

UNRELATED WITH TREDGOLD'S AND GODDARD'S CLASSIFICATIONS ¹

TREDGOLD	GODDARD	TYPE OF WORK
<p>A feeble-minded person is one who is capable of earning his living under favorable circumstances, but is incapable, from defect existing from birth or from an early age, (a) of competition on equal terms with his fellows, or (b) of managing his affairs with ordinary prudence.</p>	<p><i>Moron</i> Low (8 and 9 years). 1. Errands. 2. Light work. 3. Makes beds.</p> <p>Middle (10 years). Good institution helpers. Routine work. High (11 and 12 years). 1 years. Fairly complicated work with only occasional oversight. 12 years. Uses machinery. Can care for animals. Cannot plan.</p>	<p>Academic Work Language, reading, writing, nature study, number</p> <p><i>The Kitchen</i> Wash and iron more difficult pieces. Clean gas range. Wash windows. Clean cabinets, closets, ice boxes, scrub floors, cook and serve luncheons.</p> <p><i>The Shop</i> Make larger and more difficult problems which are useful and often have commercial value.</p> <p><i>The Gymnasium</i> Rhythm work. Command and imitative work. Dumb-bells and wand drills, apparatus work. Folk-dancing. Tactics.</p> <p><i>Music</i> Rote songs.</p> <p><i>Manual Training</i> Difficult problems in basketry, brush-making, rug-making, sewing.</p> <p><i>Academic Work</i> Language, reading, numbers, writing, nature study.</p> <p>If there are middle and high-grade morons in the special classes, the same kind of work is given them, but the problems are of increasing difficulty.</p>

Publishers, Yonkers-on-Hudson, New York.

rk. The best-trained children from the highest group in the departmental class are promoted to the trade



A SUMMARY OF THE TRAINING OF THE FEEBLE-MINDED

Objectives	Specific habits, skills, to be established; attitudes, and interests to be developed	Methods and aids in teaching
1. Health	Habits of cleanliness Proper choice of food and drink Proper habits of dress Proper exercise and posture Habits of caring for eyes and teeth Avoidance of colds and contagious diseases Care during illness	Health education. Hygiene "Safety first," and first-aid drills Physical training Rudimentary knowledge of food values through food projects, posters, and health dramatization work
2. Command of fundamental processes	Habit and skill in reading simple material Write simple letters, checks, and receipts Solve simple problems in addition, subtraction, multiplication and division, simple interest, making change	Practice in reading simple and entertaining material Writing exercises and drills Drill in the mechanics of arithmetic Projects of store, market, and bank
3. Worthy home-membership	Right attitude toward parents, home, brothers, and sisters Coöperation in household tasks Habits of courtesy, kindness, thoughtfulness, and unselfishness in the home Interest in beautifying home	Projects involving coöperation School recognition for home tasks or chores Class-room conduct Manual art work for home furnishings (baskets, trays, paper-racks, foot-stools, tables, etc.)
4. Vocation	Proper attitude toward work, employer, employee Habits of industry Skill in some vocation	Training in school shops and laboratories Training in agriculture, homemaking, household activities, gardening, poultry raising, dairying, or local industrial work Practical experience in local industries, shops, and farms Vocational counseling and guidance
5. Citizenship	Patriotism Proper attitude toward government, law, and schools, neighbors, community members, community enterprises Respect for rights of others	Example of teachers and school policy Patriotic exercises History Geography Excursions to municipal, county, and (if possible) state buildings Desirable class conduct Class self-government
6. Worthy use of leisure	Interest in outdoor recreations A liking for good, even though simple, stories A hobby Appreciation of music and art Desire for clean, wholesome movies, plays and other amusements	Group singing Story reading and telling Club work Manual arts Dramatization Music appreciation; phonograph records Art appreciation; prints of good pictures Excursions to art exhibits and local picture dealers Nature study excursions to parks, country, woods, lakes, rivers, etc.
7. Ethical character	Christian conceptions and standards of morals Habits of honesty, truthfulness, unselfishness, helpfulness	Example of teacher and school Club work emphasizing character building Stories, especially biographies Honest, thorough work in classroom Practical application of morals in schoolroom and playground

Special technique required. The actual teaching of feeble-minded children requires a technique quite different from the teaching of normal children. Often the novice hopes to teach by customary methods slowed down or simplified, forgetting that the feeble-minded child's limitations preclude those methods. The dull child's interests are different from the normal child's, his voluntary attention-span is short, his involuntary attention is readily attracted to trivialities, and he is listless or restless. He is not resourceful, lacks ambition and initiative, cannot understand the abstract, is not interested in remote goals, and is either apathetically non-confident or blatantly overconfident. His memory is non-serviceable. His meager mental life may be reflected in unrestrained verbalism or its expression may be inhibited by clumsy speech mechanism.

Mental activity is best aroused by coördinating manual or bodily activity. Because of the short memory-span, lack of attention, and the inability to concentrate, drill methods must be stressed. Drill periods must be frequent and of short duration. The work must be concrete, highly motivated, many visual "aids" must be utilized and often made entertaining as by introducing games. Teaching by the project method has been found to give splendid results. In appreciation courses, the teacher's work must be very specific, for the dull children "have eyes, yet see not; ears, yet hear not." The teacher must teach these children to see, to hear, and to feel.

CASE STUDIES

1. *A mentally subnormal*

The case. Esther has an I.Q. of about 80. On three Binet tests given when Esther was ten, twelve, and fourteen years of age, and given by different testers, she made about the same ratings. Through both junior and senior high-school she did not receive a

single "C" grade; all her grades were "B" or "A." She graduated from high school with college recommendations, and entered a large state university the following fall. At the end of the first six weeks she was advised to abandon college work. She is now staying home and taking music lessons. Esther has five older brothers; all finished high school, but it required several of them five years to do so. School records show that the brothers' I.Q.'s range from 80 to 102. None graduated with college recommendations.

Esther's parents are well-to-do and live in a beautiful home; her mother is prominent socially. Esther is good-looking, and has charming manners; she dresses exceptionally well, and in high school was active in dramatics and many other extra curricular activities. She is planning to go to some small select college where she will be given more individual attention, and where "her ability" will be recognized.

Queries. What would you advise Esther to do? How would you explain her school achievements, in the light of her I.Q. ratings? Why did her brothers do such poor work in comparison with Esther's good record?

2. *An idiot*

The case. Emily K. was born an idiot; her parents and many brothers and sisters were intelligent individuals. Emily's misfortune was always explained as being due to injuries at birth. However, one of the brothers, when about twenty-five years of age, was committed to an institution for the insane, and another became an inebriate. A sister lost her mind after childbirth.

Query. Would you be willing to accept the family's explanation of Emily's condition? Why?

SELECTED REFERENCES

1. Goddard, H. H. *The Psychology of the Normal and the Sub-normal.* Dodd, Mead and Company, 1921.
2. Goddard, H. H. *Feeble-Mindedness: Its Causes and Consequences.* The Macmillan Company, 1914.
3. Hollingworth, L. S. *The Psychology of Subnormal Children.* The Macmillan Company, 1923.
4. Irwin, E. A., and Marks, L. A. *Fitting the School to the Child.* The Macmillan Company, 1924.

5. Kuhlmann, F. "Experimental Studies in Mental Deficiency"; in *American Journal of Psychology*, 1904.
6. Murdoch, K. "Rate of Improvement of the Feeble-Minded as Shown by Standardized Educational Tests"; in *Journal of Applied Psychology*, September, 1918.
7. Ordahl, L. E., and Ordahl, G. "Qualitative Differences between Levels of Intelligence in Feeble-Minded Children"; in *Journal of Psycho-Asthenics*, June, 1915.
8. Strong, E. K. "The Learning Curve as a Diagnostic Measure of Intelligence"; in *Psychological Bulletin*, vol. 14, p. 153. (1917.)
9. Wallin, J. E. W. *Clinical and Abnormal Psychology*. Houghton Mifflin Company, 1927.
10. Wallin, J. E. W. "Studies in Mental Defects and Handicaps." *Miami University Bulletin*, Oxford, Ohio, January, 1924.
11. Wallin, J. E. W. *The Education of Handicapped Children*. Houghton Mifflin Company, 1924.
12. Woodrow, H. *Brightness and Dullness in Children*. J. B. Lippincott Company, Philadelphia, 1923.

CHAPTER VII

SPECIAL TYPES OF FEEBLE-MINDEDNESS

Types and causes. When feeble-minded children are classified according to physical characteristics, we find that the great majority (about 90 per cent) do not, to the uninitiated, at first sight differ very much from ordinary children. Only a very small number (about 10 per cent) are marked by physical characteristics. In this small group there are six special types, due to two different kinds of causes, I, arrested or perverted development, which includes: (1) cretins, (2) Mongols, and (3) microcephalics; and II, acquired forms, which include: (4) hydrocephalics, (5) paralytics, and (6) meningitics.

I. DUE TO ARRESTED OR PERVERTED DEVELOPMENT

1. *Cretins*

Cretinism. Cretinism is a condition due to the lack of development or functional inactivity of the thyroid gland. The thyroid gland produces a powerful internal secretion, the absence of which gives rise to certain definite symptoms. Cretinism is common in certain hilly districts in Switzerland, India, Burmah, Madagascar, and America, as well as in other countries. When cretinism is restricted to a locality, goiters are often present. Sporadic or isolated cases arise in all parts of the country, and in these cases the thyroid gland is entirely absent.

Characteristics. In the case of cretinism there is a collection of semi-fluid material just underneath the skin, which gives the child a bloated appearance. The main characteristics include thick, coarse features, a flattened nose, widely

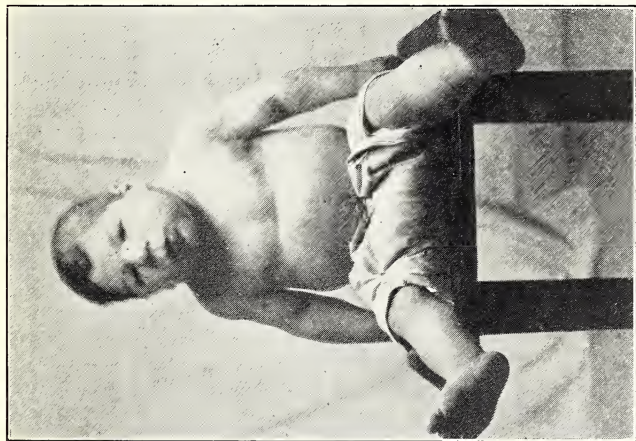
separated eyes, thick and swollen eyelids, thick lips and the mouth partly open, large, clumsy tongue (often protruding), and a rough, dry, and sallow skin. The hair is dry, poorly nourished, of a darkish color, and it is coarse and scanty. Over each collar-bone is a swelling resembling a pad, and the abdomen is protuberant. The head is usually large; the legs are extremely short and bowed; the hands and feet are short, stumpy, and poorly formed. The most striking characteristic of all is the dwarfish stature. Many children of fifteen or sixteen years of age do not measure more than three feet in height. There is also a slow, waddling gait, thick, indistinct speech, and a dull, apathetic, and unobservant expression. The neck is usually short and thick.

Cretins are often voracious eaters, but suffer from general muscular weakness even though they are well nourished. Bodily balance is unsteady, and all movements are characterized by labored clumsiness.

Mentally the cretin also shows a decided lack of development. There is a general impairment of all the faculties and, according to their intelligence, they are rated as idiots and various grades of imbeciles. It is doubtful whether cretinism can occur without a stunting of mental powers. Cretins are very listless, slow, placid, docile, and as a rule apathetic. They show little trace of emotion, but show pleasure and amusement in very simple ways. The milder cases can be taught to read and write simple words, to count, to do little sums in addition and subtraction, to develop clean habits, and to perform small tasks.

Causes. Very little is known as to the cause of the thyroid anomaly that is responsible for cretinism, but in some localities it seems to be related in some peculiar way to the water supply. It is thought ¹ that a specific microbe or virus of an infectious nature may be present in the water supply,

¹ See Tredgold, *op. cit.*, p. 282.



Sporadic cretin. Age 10.5; Binet age less than 1.



A CRETIN, AND A MONGOL

Mongol Imbecile. Age 12.4; Binet age 3, at age of 11.7;
I.Q. 21.

(From Wallin's *Education of Handicapped Children*. Houghton Mifflin Company.)



although none has been isolated. Some evidence ¹ has been produced to show that a toxin is present in the water which is not removed by filtration, but is destroyed by heating the water.

The cause of sporadic cretinism, occurring in regions in which cretinism is not common and in families in which goiters are unknown, is not known. It is just possible that there may be a neuropathic inheritance responsible, but there is not evidence to prove this.

Pathology. Thyroid secretion exercises a profound influence upon the nutrition of the brain, and its absence is responsible for the mental peculiarity of cretinism. No brain lesions have been found, but the neurones on account of the lack of nutriment seem unable to develop or to perform their function. In *post-mortem* examinations of cretin brains an incomplete development of the cortical cells, similar to that in hereditary feeble-mindedness, was found. Sometimes the whole brain was found to be simply convoluted and small.

Treatment and results. The giving of doses of extract of sheep's thyroid to take the place of the child's missing thyroid secretion is the treatment commonly followed; the treatment must be begun early, and must be continued during the life of the individual. Some children do wonderfully well under the treatment and are transformed from gross, ugly creatures to bright, intelligent children, but others, although they show a marked reaction to treatment, never get beyond a certain point and remain feeble-minded. As a rule the future of the cretin is not a bright one, even though efficient treatment is commenced early; the mental development is rarely commensurate with the bodily development. Dr. Tredgold says that "it may be laid down that, whilst in some cases *cure* may take place if treatment be

¹ Wilms, *Deutsche Medizinische Wochenschr.*, March, 1910.

initiated not later than the third month, should the first year be allowed to pass without thyroid administration, the cretin, although improving to some extent, will seldom fully make up his mental arrears."¹

2. *Mongols*

Mongols have been so named from the curious facial resemblance to the Mongolian race. In some countries they do not form more than 1 per cent of all feeble-minded cases; in other countries, about 4 or 5 per cent.

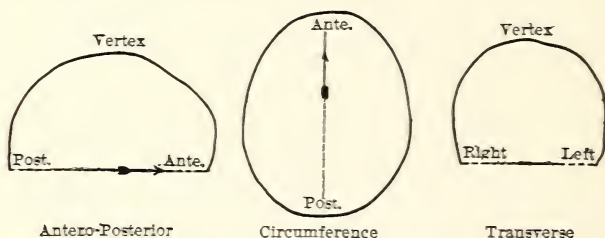


FIG. 35. "MONGOLIAN" CRANIAL CONTOURS

Characteristics. The characteristic features are the obliquity of the eyes and eyebrows, a flattened bridge of the nose, and a rather small, rounded, and flattened (front to back) skull. The face, too, is considerably flattened. The tongue at birth is unusually large, and sometime after birth becomes marked by deep, irregular, transverse fissures and the papillæ become swollen. Defects of the eyes are very common, such as squinting, cataract, cross-eyedness, and astigmatism. Speckled irides are very common. The ears are generally small and crumpled. The hair is scanty, very dry, and wiry. The cheeks are often flushed to a bright red. The lips are fissured transversely and the mouth is partly

¹ Tredgold, *op. cit.*, p. 290.

open, often with the tongue protruding. The skin is rough and dry, and often covered with fine hairs. The hands and feet are broad, flabby, and clumsy. Knock-knee and flat-foot are common. The abdomen is usually large and tumid. Many of the characteristics are present at birth.

Mentality. Mongols vary considerably in mental capacity, and on the whole the degree of intellectual deficiency seems to correlate with the intensity of the physical characteristics. Many are of a rather high-grade feeble-mindedness, some are decided idiots, and the great majority are medium-grade imbeciles. Their speech is often a persistent lalling or baby language. As a baby, the Mongol is good-tempered and readily amused. At first there is no evidence of mental impairment and he looks bright and intelligent. The first sign of feeble-mindedness is shown in the late ability of sitting up, walking, and talking. Grimaces and facial contortions appear early. The joints and muscles are sometimes very loose, permitting of unusual attitudes. Furrows are very common on the palms of the hands, and the hands and feet are cold. Mongols are below average in height and weight. A Mongol of eight or nine years often resembles a normal child of four or five in appearance. They have good powers of mimicry, and will imitate animals or persons very closely. Usually they are fairly happy and contented, and often are very fond of music and dancing.

Quite a large number of Mongols die in infancy, and thus escape recognition as Mongols. Those who live to a later age show a weakened resisting power to disease and are liable to sudden death. The average age at death is about fourteen years; very seldom do they reach the age of thirty.

Causes. The cause of Mongolism is still unknown. Most commonly the condition is given as probably being due to an arrest or perversion of fetal development, as a result of exhaustion of the reproductive powers of one (usually the

mother) or both of the parents. A very few cases are encountered when the parents are young and strong; the great majority of cases are the last of a large family. One investigator ¹ found that of 325 cases collected from medical literature, 189 were the last children in their respective families, and only 44 the first. In his own study of 121 Mongols, 25 were found to be the ninth to the fourteenth child; 30 were found to be the sixth, seventh, or eighth; 39 were third, fourth, or fifth; 13 were second; and 14 were the first child in the family. Of 27 mothers and 19 fathers of Mongols, 77 per cent and 8 per cent respectively were between the ages of thirty-seven and forty-four. Some were over the age of forty-four. It is very rare to find another mentally defective child in a family that contains a Mongol, and practically never possible to find another Mongol in the family. Very, very rarely is there a neuropathic taint in the family containing a Mongol; thus the likelihood of Mongolism being due to an inherited taint is very doubtful.

Some cases have been found where the cause seemed to be a state of severe physical prostration of the mother during the gestation period. Wallin ² brings out the fact that advanced age in itself is not the important cause of Mongolism, but considers the cause to be any agency which can produce generative depletion or perversion, such as infection or toxication, as well as exhausted or depleted procreative energy. Supporting these conclusions he says:

These defectives [Mongols] are often referred to as "unfinished" or "ill-finished" children, and the arrest of development has been ascribed to depleted reproductive power due to excessive child bearing or advanced age of the parents. But the ratio of the first, second and third born was appreciably higher among twenty-one

¹ Lapage, *op. cit.*

² Wallin, J. E. W. *The Education of Handicapped Children*, pp. 337-38. Houghton Mifflin Company, 1924.

Mongolians for whom the order of birth was obtained, than among 680 consecutive non-Mongolian clinic cases varying from idiocy to normality examined by the writer, while the ratio of the late born was decidedly less among the Mongolians. Almost one third of the last born among twenty-two Mongolians were also the first born. The average number of children in the families having the Mongolians, was 4.6, while the average was higher, 4.8, in the families of 894 consecutive clinic cases of various levels of intelligence. While the ages of the parents at the time of the birth of the Mongolians averaged about six years higher than the ages of the parents at the time of the birth of the other feeble-minded children, the ages of the fathers of the Mongolians varied from twenty-three to sixty-four, and of the mothers from twenty-two to forty-five. Moreover, the ages of the parents of the Mongolians who were among the first three born, constitute the youngest group. Half of the Mongolians were born during the period considered most favorable for procreation, half of the mothers being less than thirty-five, and half of the fathers less than thirty-nine.

Pathology. It has been suggested that serious deformities point to a generally unfinished state. Poorly developed ears, lax ligaments and hypotonia of the muscles, and not uncommonly an incomplete condition of the heart and brain all indicate a state of unfinished development. The brains of Mongols seem to differ considerably; the convolutions are usually primitive and much more simple than is normal; some show gross signs of arrested development or smallness or simplicity of certain parts; others show marked changes in the cerebral cortex. Other Mongol brains show few definite abnormalities.

Deformity of the skull exists because the brain is small and does not develop normally. In many Mongols the thyroid gland is smaller than normal, but the pituitary body seems to be unchanged. The majority of cases do not show any changes of the ductless glands, and there is nothing pathological to indicate that Mongolism is anything but failure of development.

Treatment and results. There is no known specific method of medical treatment that has been found to be of any value in improving either the physical or the mental condition of Mongolism. The only improvement so far possible is through educational methods. Because of their clumsy and incoördinate movements they have but limited ability in industrial arts, but every effort should be made to give them some occupation that interests them, even if it is of the simplest kind.

Etiology of Mongolism. Brousseau and Brainerd,¹ in a most intensive study of Mongolism, summarized their findings and the findings of others in regard to the etiology of Mongolian imbecility as follows:

1. That Mongolian imbecility cannot be a reversion to a primitive type, since the resemblance to the Chinese or Japanese race is mainly superficial and since, furthermore, the condition is a pathological one.
2. That Mongolian imbecility is not due to parental alcoholism, tuberculosis, or syphilis, although these conditions may in many cases be powerful contributory agents.
3. That Mongolian imbecility is not due to neuropathic heredity. Careful investigation of cases shows that the family history is generally good, and we find that the brothers and sisters of Mongols are, with few exceptions, mentally and physically normal.
4. That Mongolian imbecility is not due to extremes of age in one or both parents. The advanced age of the mother may be a potent contributory cause, but it is not alone sufficient to explain the condition; we find many Mongols born to mothers who are under 35 years of age.
5. That Mongolian imbecility bears no relation to the order of birth or to the number of children in the family. An examination of 800 cases shows that 57.49 per cent of the Mongols

¹ Brousseau, Kate, and Brainerd, H. G. *Mongolism: A Study of the Physical and Mental Characteristics of Mongolian Imbeciles*. The Williams and Wilkins Company, Baltimore, 1928.

belong to families where the Mongol was the first, second, or third child.

6. That Mongolian imbecility is not due to mental strain. Many mothers report that the pregnancy in the birth of a Mongol was calm, uneventful, and altogether free from anxiety; furthermore, statistics show that Mongolism did not increase in the warring countries during the World War, although pregnant women were subjected as never before to continued terror and anxiety.
7. That Mongolian imbecility has not for its essential cause some disease of the maternal reproductive organs, or undernourishment or overwork of the mother during pregnancy. If such were the cause it would be difficult to explain the condition of Mongolism in one of twins.
8. That Mongolian imbecility is possibly induced by some obscure disturbance of the ductless glands. There may be inherited or congenital glandular instability, or the mother during pregnancy may develop certain endocrine disorders which may be transmitted to the child. Further investigation of a pluriglandular syndrome or the disfunction of some particular gland. Some endocrine disturbance can be demonstrated in every Mongol.

3. *Microcephalics*

Microcephalic is usually the term applied to the feeble-minded whose skull measures less than seventeen inches in its greatest circumference. However, it is shape rather than size that is the criterion, for occasionally a greater cranial measurement is encountered in microcephaly. The total number of microcephalics, including the milder cases, comprises 10 or 12 per cent of all feeble-minded individuals.

Characteristics. In microcephaly the head is extraordinarily small. Because the brain is so very small, the sutures and fontanelles of the skull close early; in some cases they are already closed at birth. This results in a narrow, receding forehead and a more or less pointed skull cap. The face, body, and limbs are usually well developed, and except that, in the more extreme cases, there is often spasticity and

stiffness of the limbs, a microcephalic child shows little physical deformity other than that of the head.

Mentally most microcephalics are classed as idiots when the head measurement is used as a criterion of the condition. When the shape of the head is used as the criterion of microcephaly, many are classed as higher-grade feeble-minded.

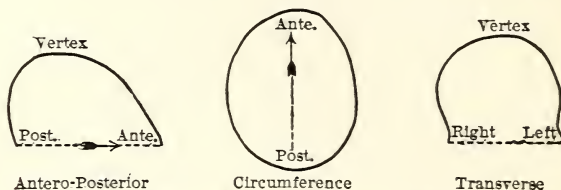


FIG. 36. MICROCEPHALIC CRANIAL CONTOURS

Though often amiable and bright, microcephalics are subject to violent and passionate outbreaks during which they may do damage. Some cases are very restless and quick in their movements, showing a curious birdlike movement of the head. Like other mentally defective children, they are slow in learning to walk and to talk. Many never learn to talk at all, but make inarticulate sounds of pleasure or pain. They are often imitative, superficially bright, and loquacious, even though low-grade mentally. They are difficult to teach.

Causes. Microcephaly is due to hereditary factors, just as is the condition of feeble-mindedness in general. This is concluded from the fact that frequently several children or all children in a family suffer from the condition, and also because it recurs in succeeding generations.

Pathology. As the term implies, the brain of the microcephalic is very small. While the cerebellum is smaller than normal the cerebrum is much more affected. Often the posterior lobes of the cerebrum are not large enough to

cover the cerebellum. This gives the peaked effect to the skull. Complex brain convolutions are lacking. The weight of the brain varies greatly; the lightest on record being about 6 ounces. Many weigh around 12 ounces. (Average normal brain, male, 48 ounces; female, 43 ounces.) Since intellect is dependent upon quality of brain as well as quantity, there is no direct relation between size of brain and intellect even in microcephaly.

Treatment and results. There is no cure for the condition of microcephaly. At one time the operation of craniectomy, or of opening and raising the skull bones in order to give the brain room to develop, was tried. That these operations were unsuccessful can be readily understood, since the brain is not arrested in its development on account of the small skull, but was abnormally small from the first so that the skull does not develop as a subsequent condition.

By training, teaching, and treatment a fair amount can be done to train the microcephalic child, but nothing can make a brain function properly which is small because of the failure of formative processes before birth.

II. ACQUIRED FORMS

The remaining three special types of feeble-mindedness, hydrocephalic, paralytic, and meningitic, are further classed as acquired forms, due to causes acting during intra-uterine life or early childhood. Apart from these causes the brain would have developed normally. Nearly all of these cases are due to inflammatory lesions.

4. *Hydrocephalics*

Hydrocephaly is not very common in feeble-mindedness. This condition is so denominated because of the cerebrospinal fluid in the ventricles of the brain or between the protective coverings of the brain. In popular parlance it is commonly spoken of as "water on the brain."

Characteristics. The outstanding characteristic of hydrocephalus is the enormous circumference of the head, often 30 or more inches. A distortion of the skull is produced and a distention of the skin may be so great as to make the upper parts of the whites of the eyes visible, while the pupils are hidden by the lower eyelids. The head appears globular, balloon-shaped, the face appearing diminutive by contrast. The forehead tends to bulge forward. Hydrocephalic cranial contours are given in the accompanying diagram.

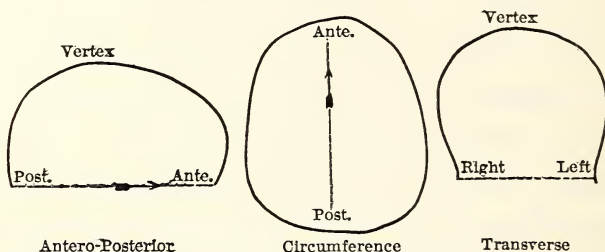


FIG. 37. HYDROCEPHALIC CRANIAL CONTOURS
Compare with Figures 34 and 35, for relative sizes and shapes.

Often the body is wasted, convulsions are frequent, and severe paralysis may be present. Many are bedridden. On account of muscular weakness and paresis, movements are clumsy and poorly coördinated. The legs are more frequently and severely affected than the arms. Impairment of sight and hearing are common, but there are no stigmata of degeneracy. The scalp is thinned, and often the veins are large and prominent.

Mentally, hydrocephalics vary from idiocy to mild-grade feeble-mindedness. They are quiet, affectionate, obedient, and willing to do what they can, even though paresis may prevent them from doing much.

Causes. When the cerebral fluid is in the cavities of the hemispheres, it distends them and compresses the brain;



A HYDROCEPHALIC

Age 19; Binet age 7.4 at age of 17.8; I.Q., 46.

(From Wallin's *Education of Handicapped Children*. Houghton Mifflin Company.)



when it is between the skull and the brain, it presses upon the brain. This pressure upon the brain ultimately causes feeble-mindedness. The cause of the collection of the cerebral spinal fluid is obscure, but most probably results from chronic meningitis, or some other infection. Occasionally hydrocephaly is present before birth, but in most cases the symptoms are not present until the child is a few months or years of age.

Pathology. The cerebro-spinal fluid accumulating in the ventricles of the brain may amount to several pints. The pressure of the fluid gradually thins and destroys the adjacent brain tissue. In severe cases the hemispheres are reduced to a fraction of an inch in thickness. The cerebellum is much less affected than the cerebrum. The pressure of the fluid may also cause blindness or deafness.

Treatment and results. There is no known cure for hydrocephalics; they are educable according to the grade of mentality or the stage of the disease and of associated defects. Performance of manual work is limited by muscular weakness, clumsy movements, often poor eyesight, and varying degrees of paralysis. Difficulty in balancing the head often makes walking impossible. Most cases die early. Since none live long, it is more important to amuse rather than to try to train these individuals.

5. *Paralytics*

Characteristics. In the case of paralytics the amount of paralysis varies enormously. In some the only observable defect may be lack of thumb opposition of one side. There are two general types of motor paralysis — spastic and flaccid. In the spastic variety the muscles are rigid and the reflexes are increased, which shows that there is a brain lesion. In the flaccid variety the muscles are flabby and the reflexes are abolished, which is the result of a lesion of the

spinal cord. Both sides of the body may be affected (diplegia), or only one side (hemiplegia), or only the lower limbs (paraplegia), or only one set of muscles (monoplegia). In hemiplegia the arm and leg are usually paralyzed together, but the face may also show evidences of one-sided paralysis. The affected limbs are stiff, and much weaker and generally much smaller than the unaffected limbs. An involuntary twisting and writhing of the affected parts, known as *athetosis*, occurs. Paralytic cases show a great tendency to slaver, and there may be a constant stream running down the child's chin.

Mentally paralytics vary from profound idiocy to super-normality. Many are capable of considerable literary advancement and motor coördination. They are often very excitable and emotional, and even those who are apparently normal in intelligence are more or less irritable or emotionally unstable, or infantile. As a rule they are at least feeble-minded, and are dependent upon others both on account of their mental and their physical condition.

Causes. In the paralytics there has been some destruction of part of the upper motor neurones, or of the conducting paths of the brain during intra-uterine life or at birth. This may be the result of hemorrhage, injury, or inflammation. In some cases there is no definite evidence of a destructive lesion, but only poor development of the nerve cells of the upper motor neurones. When these neurones are rendered defective a stiff or spastic paralysis with accompanying mental deficiency is the result.

Pathology. *Post-mortem* examinations of affected brains show, among other conditions, localized areas of softening, atrophy, sclerosis, and cysts. However, since these examinations were made years after the onset of the affliction, it is impossible to tell whether the lesions found were originally due to the individual's condition, or whether many of

them developed as secondary changes resulting from the affliction.

Treatment and results. Treatment consists largely in educational procedures, and improvement is determined by the intelligence of the individual. The extent of paralysis is no criterion as to the possibility of improvement. Some who suffer from severe physical handicap may be taught to perform useful work, while others in whom there is but slight paralysis are hopeless.

6. *Meningitics*

There are many substances which act as poisons upon the body cells. One group of toxins is produced by the action of microörganisms. It is this group that is responsible for meningitic feeble-mindedness.

Characteristics. In most cases the affection occurs within the early years of childhood, but there is a possibility of prenatal infection. The course of illness resulting in this type of mental deficiency varies considerably, but some symptoms are common. The onset is usually rapid, and the child is suddenly seized with headache, fever, vomiting, unconsciousness or delirium, convulsions, and often paralysis. A very severe pain in the head is a marked characteristic. The convulsions are general and may be continuous. When not continuous, the patient is either delirious or comatose between their onsets. Paralysis may not appear until a few days later, or it may not appear at all. It is always quite evident that the child is seriously ill and that the seat of the trouble is the brain.

In a very few cases the child recovers completely. In others there is a marked change for the worse after an illness of ten to fourteen days; the pulse and respiration become more irregular, the coma deepens, and the patient dies, often after a series of convulsions.

When the child recovers there is usually an impairment of mentality. This may be noticed immediately, or it may make its appearance only when the child begins to get about, or upon his attending school. His disposition may be altered, and there is either unusual irritability or apathy and dullness. Sometimes recovery seems complete, and it is only gradually discovered that the child cannot progress with his studies. Incurable deafness often accompanies this condition, and paralysis is very common.

Mentally the child is left in any degree of feeble-mindedness, varying from idiot to normal.

Causes. In severe acute infectious diseases, such as cerebro-spinal meningitis, inflammation of the brain (encephalitis), and infantile paralysis, toxins may produce hardening and scar formation in the nervous tissue, and thickening and adhesion of the brain membranes, which interfere with cerebral circulation, may be followed by mental deficiency. Some of the milder infections, such as scarlet fever, typhoid, diphtheria, or measles may also be followed by mental deficiency, although this happens but rarely.

Pathology. Pathological changes consist of softening areas and sclerosis, in addition to the general arrest of cortical development brought about by the toxins. Lesions produced by hemorrhage are common.

Treatment and results. There is no cure for the meningitis after the brain damage has been done. Efforts must be directed toward prevention rather than cure. Educational treatment must be directed by, and is successful to the degree of intelligence of the meningitic.

CASE STUDIES

1. *Acquired type of feeble-mindedness*

The case. James B. was a very intelligent child. When only three years of age, with very little assistance, he learned to read. At five he was able to repeat verbatim many chapters from the Bible, long selections from Shakespeare, and was greatly interested in Greek legends.

When five years old, James had a severe attack of scarlet fever. Although physicians despaired of his life, James recovered. Physically he was soon back to normalcy, but the parents soon noticed that he was no longer as alert mentally as he had been before his illness. Now, at the age of twelve, James is in the fourth grade in school. He reads laboriously, has great difficulty in memorizing even short selections, and is able to do practically nothing in arithmetic. His brothers and sisters are all in special classes for gifted children.

Queries. How would you diagnose James's condition? Do you think he will suddenly "pick up," mentally, perhaps during adolescence, as his parents hope? Will James's brothers and sisters, if they mate with normal individuals, run chances of having feeble-minded children? James's adult relatives are all professional people, many of them quite prominent in their work. What course of study would you prescribe for James?

2. *Arrested development type*

The case. Paul's family moved from a large city to a small town. Paul was fourteen years of age, and suffered from hydrocephalus. In the city his academic work was directed by a "home teacher"; the small town school system had no home teachers, so Paul was sent to the second grade of the public school. Paul's head was so large and his joints so stiff that when he fell down, he was not able to arise without aid from an adult. He walked very slowly with a cane, and fell down frequently. Many of the children in school told their parents each day about Paul's strange appearance, his inability to do school work, and his frequent falls. Paul's health was very poor, and it was not necessary to give him an intelligence test to classify him as an imbecile.

Queries. If you were the principal of the school to which Paul was sent how would you handle the case? What academic work would you outline for him? Could you refuse to let Paul attend a public school?

SELECTED REFERENCES

1. Jelliffe, S. E., and White, W. A. *Diseases of the Nervous System*. Lea and Febiger, Philadelphia, second edition, 1917.
2. Lapage, C. P. *Feeble-Mindedness in Children of School Age*. Manchester University Press, 1911.
3. Porteus, S. D. "Cephalometry of Feeble-Minded"; in *The Training School Bulletin*, June, 1919.
4. Tredgold, A. F. *Mental Deficiency: Amentia*. William Wood and Company, New York, second edition, 1915.
5. White, W. *Outlines of Psychiatry*. Nervous and Mental Disease Publishing Company, Washington, sixth edition, 1918.

CHAPTER VIII

GIFTED CHILDREN

Now the most important object of all educational schemes is to catch these exceptional people and turn them to account for the good of society. No man can say where they will crop up; like their opposites, the fools and the knaves, they appear sometimes in the palace and sometimes in the hovel; but the great thing to be aimed at, I was about to say, the most important end of all social arrangements, is to keep these glorious sports of Nature from being either corrupted by luxury or starved by poverty, and to put them into the position in which they can do the work for which they are especially fitted. — HUXLEY.

Mentally superior children. In this chapter mentally superior children will be considered as those who test much above average on a standardized intelligence test. In Terman's classification (see page 232), 130 I.Q. is given as the mean ranking of "very superior" intelligence. This is often considered the lower limit in selecting superior children for scientific study; some studies are based upon 140 I.Q. That no specific point on an intelligence scale can be denoted as the correct lower limit of superiority is of course recognized by all investigators. For practical purposes, however, some specific point must be considered the lower limit in selecting children for extensive studies in superiority.

This general classification of superior children wholly on the basis of intelligence will exclude types who have special talents in fields not measured by the intelligence tests, as music, art, poetry, linguistic ability, mechanical fields, and the like, if these special abilities are accompanied by average or low I.Q. It will include children with high I.Q. even though they are psychopathic. Despite this fact, the I.Q. classification is still the best available in selecting a large group of superior children.

1. *Frequency, and cause*

Frequency. Terman,¹ in testing 905 school children, found that the percentage distribution of the children was as follows:

The lowest 1 per cent go to 70 or below;	the highest 1 per cent reach 130 or above
The lowest 2 per cent go to 73 or below;	the highest 2 per cent reach 128 or above
The lowest 3 per cent go to 76 or below;	the highest 3 per cent reach 125 or above
The lowest 5 per cent go to 78 or below;	the highest 5 per cent reach 122 or above
The lowest 10 per cent go to 83 or below;	the highest 10 per cent reach 116 or above
The lowest 15 per cent go to 88 or below;	the highest 15 per cent reach 113 or above
The lowest 20 per cent go to 91 or below;	the highest 20 per cent reach 110 or above
The lowest 25 per cent go to 92 or below;	the highest 25 per cent reach 108 or above
The lowest 33 per cent go to 93 or below;	the highest 33 per cent reach 106 or above

It will be noticed that the highest one per cent of the children tested at or above 130 I.Q. This must be kept in mind when findings from group studies are given. In order to yield higher I.Q.'s the populations must, of course, be proportionately larger. The highest I.Q.'s so far discovered have been about 200. Such cases will occur only once in very many thousands of unselected children tested.

Discovering the bright children. In general, experienced teachers are fairly good judges of a child's ability, but that they do not appreciate the superior child's ability is demonstrated repeatedly. The dull and problem children demand so much of the teacher's attention and energy that she gets to know these children quite well; the superior child often is neglected and his ability often is unrecognized. In a mental survey of a city school system,² the elementary teachers were asked to indicate their superior pupils and their mentally deficient pupils. The teachers suspected 725 children as being mentally deficient, and only 45 as mentally superior. One child in 33 was reported as possibly deficient, and only one child in 527 was reported as superior. Theoret-

¹ Terman, L. M. *The Measurement of Intelligence*, chap. v. Houghton Mifflin Company, 1916.

² Gesell, Arnold. *Exceptional Children and Public School Policy*. Yale University Press, 1921. (Pamphlet.)

ically superior children are about as numerous as the inferior, yet it cannot be definitely stated that this is actually the case. That parents are quite prone to overestimate their children is proverbial. On account of the unreliability of personal judgments, the intelligence tests are used as the best single source of discovering the superior child.

In judging a child's intelligence, teachers and parents alike are biased by socially valued factors, such as personal appearance, neatness, obedience, tact, thoughtfulness, prestige, wealth, fluency of speech, and so on. Achievement in school independent of age is another common source of error in estimating innate intelligence. An over-age child competing with an under-age child may do much better work, yet due to the age his intelligence may be much lower than the under-age child. It is not achievement *per se*, but achievement while the child is young that is now considered an indication of intelligence.

Causes. The great determining factor of innate mental superiority is heredity. Environment is the factor that determines whether innate ability shall have opportunity to come into its own or not; as such, environment is a potent factor in the ultimate delineation of ability. The old idea that genius will out despite any handicaps or restrictions is no longer tenable. All indications are to the contrary. Environment is the greatest factor in releasing or in hemming in innate ability. It is on this principle that school systems are now establishing the best possible environment for all grades of intelligence. If genius would out, despite environment, it would be a waste of time and money to give the gifted child advantages.

Charts have been devised showing the hereditary nature of superior mental ability. The accompanying figure shows a family history chart of many eminent people.

Other investigations give statistical data showing the

Galton points out that 977 average men have a total of only 4 eminent relatives. Terman ¹ found that his group of 676 superior children had relatives listed in *Who's Who* many times oftener than chance would give. Their parents and relatives also held posts of responsibility in very great number.

The inheritance of superiority. Other conclusions derived from scientific study of superior individuals indirectly point to the inheritance of mental superiority. One study ¹ showed that the fathers of superior children belong to the professional classes in far greater numbers than to the skilled and labor classes. The percentage distribution was as follows:

OCCUPATIONS OF FATHERS OF SUPERIOR CHILDREN

Professional.....	31.4%
Semi-professional and business.....	50.0%
(a) Higher group.....	31.2%
(b) Lower group.....	18.8%
Skilled labor.....	11.8%
Semi-skilled to slightly skilled.....	6.6%
Common labor.....	0.13%

Cattell's ² findings in regard to the occupations of the fathers of 885 leading American men of science gave the following percentage of distribution:

Professional.....	43.1%	(in general population	3.0%)
Manufacturing and trade.....	35.7%	(in general population	34.1%)
Agriculture.....	21.2%	(in general population	41.1%)

Other studies ³ show this same predominance of the professional classes as the sources of intellectual superiority.

¹ Terman, *op. cit.*, p. 64.

² Cattell, J. McKeen. *American Men of Science*. Science Press, 1921.

³ Clark, E. L. *American Men of Letters: Their Nature and Nurture*. Columbia University, 1916.

De Candolle, A. *Histoire des sciences et des savants depuis deux siècles*. Genève, 1873.

Galton, F. *English Men of Science*. Macmillan and Company, London, 1874.

Terman's research also shows that mentally superior children are most often born in or near cities as compared with rural communities, and are more apt to come from comfortable or even luxurious homes.

The accompanying chart shows us the comparative intelligence of a limited group of offspring of lawyers and miners. Note the general superiority of lawyer's children and note,

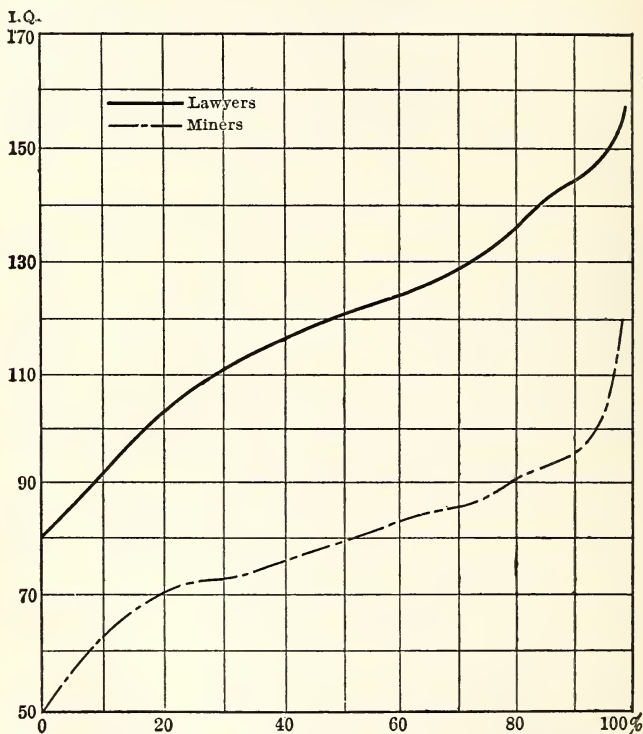


FIG. 39. PERCENTILE CURVES, SHOWING COMPARATIVE INTELLIGENCE OF OFFSPRING OF TWO OCCUPATIONAL GROUPS

Miners and lawyers, as found in Grades III-VIII, in New York State. (From Haggerty and Nash, "Mental Capacity of Children and Paternal Occupation." Reproduced by courtesy of the *Journal of Educational Psychology*.)

also, that lawyers' children are not uniformly superior to miners'. A percentage of miners' children are equal or superior to a percentage of lawyers' children.

Other native factors. In regard to racial origin, data indicate that superior children, in comparison with the general population of the cities concerned, show a 100 per cent excess of parents who are of Jewish blood: a 25 per cent excess of parents who are of American parentage; and probably an excess of Scotch ancestry. There is a very great deficiency of Latin and Negro ancestry.¹

The relative mental efficiency between boys and girls has long been a source for contention and research. It has been said that investigations always prove the superiority of the sex of the investigator, and when data are not on this side, a good reason is immediately presented that explains discrepancies so that the final interpretations still support the sex of the investigator. The most extensive studies available give a larger proportion of boys testing above 140 I.Q. than of girls.² The highest I.Q.'s so far found, those near 200, have been almost exclusively among girls. Whether these girls will live up to their intellectual promise as predicted by intelligence tests remains to be seen. Historical data show an ignominiously small percentage of eminent women in comparison to eminent men.

Cattell has aptly summarized the natural factors in support of superiority as follows:

It is evident that what a man can do depends on his congenital equipment. How far what he does do depends on his environment and how far on his congenital equipment, or how far his congenital equipment depends on that of his parents and his family line of

¹ Terman, *op. cit.* See chap. III.

² Terman in trying to locate, in the State of California, children testing above 140 I.Q., found the sex ratio among his cases to be 111:100 in favor of boys. This proportion existed after allowance was made for the greater number of boys born. The ratio of boys to girls born in the civilized world is 106:100.

descent, we do not know.... A boy from the professional classes in New England has a million chances to become a scientific leader, as compared with one chance for a negro girl from the cotton fields.

These great differences may properly be attributed in part to natural capacity and in part to opportunity. When it is asked how far the result is due to each of these factors, the question is in a sense ambiguous. It is like asking whether the extension of a spiral spring is due to the spring or to the force applied. Some springs cannot be extended a foot by any force; no spring can be extended without force. The result depends on the relation between the constitution of the spring and the force applied.

2. *Mental development of superior children*

The prodigy conception. For a long time, and occasionally even at present, it was thought that the child prodigy would meet an inglorious fate, a sudden arrest in mental development, insanity, or early death. For the dull child great hopes were often extended in that he would have a "sudden awakening," perhaps during adolescence. Many cases of eminent men, considered dull as children, were usually cited to support this view. The contentions are contrary to customary findings.

The superior child, as a rule, continues to be superior throughout life, and the dull child usually remains dull. Since the I.Q. remains fairly constant in a majority of cases, the predictions for the bright child are that his superiority will increase progressively. That is, a child who at 4 years has a mental age of 5, will not when 6 years of age have a mental age of 7, but of $7\frac{1}{2}$. A mental age of 5 at 4 years of age, shows a 25 per cent superiority above chronological age. In all probability, the child will continue to have a mental age about 25 per cent above his chronological age, as follows:

C.A.	Probable M.A.	Probable school achievement
4 years	5 years	Upper kindergarten
6 years	$7\frac{1}{2}$ years	Second school grade
8 years	10 years	High-fourth grade
10 years	$12\frac{1}{2}$ years	Low-seventh grade
12 years	15 years	First year high school

Just as retardation of one year at an early age is much more serious than a retardation of one year during later childhood, so an acceleration of a year at an early age is indicative of much greater ability than an acceleration of a year during later childhood.

In speaking of the constant mental development of the superior child, and of a relatively constant I.Q., we must bear in mind that as yet we do not know to what extent a high I.Q. or early precocity will insure mature achievement. Since an I.Q. is determined to about 50 per cent by school attainment, or rather by environment including school attainment, and since no one is able to determine the extent or limit of mental development from a child's I.Q., our predictions in regard to the outcome of children with a high I.Q. are as yet only speculative. Later achievements of the many children who are now known to have high I.Q.'s, as well as the achievements of children who have only average I.Q.'s, will be the only proof of the relationship between intelligence ratings and later mental development.

Superior children as precocious children. Astonishing achievements of children are often signs of precocity rather than permanent superiority. In some cases mental development is evidently accelerated, or various mental attributes, such as retention, attention, perception, association, and so on, are accentuated. Attributes required for mature achievement may not be developed proportionally. Mental development may be accelerated until it reaches its capacity at an age much earlier than in average individuals. That is, mental maturity may be attained much earlier in some cases, just as physiological maturity is attained much earlier in some cases, without giant stature following. Many widely advertised child prodigies of the past failed to develop into intellectual giants.

At present there is no way of distinguishing between the

precocious and the genuinely superior child — we must await developments. Goethe said that if children grew up according to early indications we should have nothing but geniuses. It is probable that a very large percentage of the children who have extremely high I.Q.'s may be precocious children, or may make notable mature achievements because of the greater opportunities that we are at present offering them and must continue to offer until we have statistical findings on the subject. Of the geniuses included in Terman's *Genetic Studies of Genius*, the men, as children, showed no definite signs of superiority and some showed a definite lack of mental ability. We cannot say that an intelligence test would have discovered latent genius in these cases, for we now recognize that intelligence tests are influenced to a very large extent by school achievement and environment. A suitable school curriculum might have discovered these geniuses during childhood, but this only suggests that it may behoove us to give superior training to all children.

3. *Physical development of superior children*

Physical development. Galton,¹ as a result of careful study, reached the conclusion that men of genius are of decidedly superior physique. He expressed his findings summarily as follows:

There is a prevalent belief that men of genius are unhealthy, puny beings — all brain and no muscle — weak-sighted, and generally of poor constitutions. I think most of my readers would be surprised at the stature and physical frames of the heroes of history who fill my pages, if they could be assembled together in a hall. I would undertake to pick out of any group of them, even out of that of the Divines, an "eleven" who could compete in any physical feats whatever, against similar selections from groups twice or thrice their numbers, taken at haphazard from equally well-fed classes. In the notes I made previous to writing this book,

¹ Galton, *op. cit.*

I had begun to make memoranda of the physical gifts of my heroes, and regret now, that I did not continue the plan, but there is even almost enough printed in the appendices to warrant my assertion. I do not deny that many men of extraordinary mental gifts have had wretched constitutions, but deny them to be an essential or even a usual accompaniment.... A collection of living magnates in various branches of intellectual achievement is always a feast to my eye; being, as they are, such massive, vigorous, capable-looking animals.

Age of walking and talking. The age of a child's learning to walk and to talk is usually considered significant in making a diagnosis of its physical and mental condition. Unless a delay in the development of these functions is known to be due to other causes, it is often considered indicative of slower mental development.

A comparison of ages at which superior children¹ have learned to walk and to talk with the ages at which normal² and feeble-minded² children developed these functions is given in the following table:

TABLE XXIV. COMPARATIVE WALKING AND TALKING AGES OF INTELLIGENCE GROUPS

	Range	Months median	Average
<i>Walking</i>			
Normal group.....	11- 30	13.54	14
Feeble-minded group.....	12- 72	21.60	24
Superior group.....	9- 18	13.00	13.4
<i>Talking</i>			
Normal group.....	9- 25	15.80	16
Feeble-minded group.....	12-156	34.44	36
Superior group.....	6- 24	12.00	13

While the average age at which the superior children learned to walk was only a little more than half a month

¹ Terman, L. M. *The Intelligence of School Children*, p. 188. Houghton Mifflin Company, 1919.

² Mean, C. D. *The Relations of General Intelligence to Certain Physical Traits*, p. 117. Teachers College, 1916.

earlier than that of the normal children, it was nearly eleven months in advance of the average of the subnormal group. The differences in the average ages of learning to talk was greater. The superior group learned three months in advance of the normal group, and twenty-three months in advance of the feeble-minded group. The differences between the normal and the superior groups are actually greater than the table indicates, for the supposedly "normal" infants used in establishing the norms for that group were chiefly the children of graduate students in a large university and who were later found to test well above the average. In these investigations, walking meant "to take a step unassisted," and talking meant "to use a word intelligently, i.e., to associate the idea with the object."

Growth in height and weight. Recent investigations of large numbers of superior children show that by actual measurement these children are, in general, physically

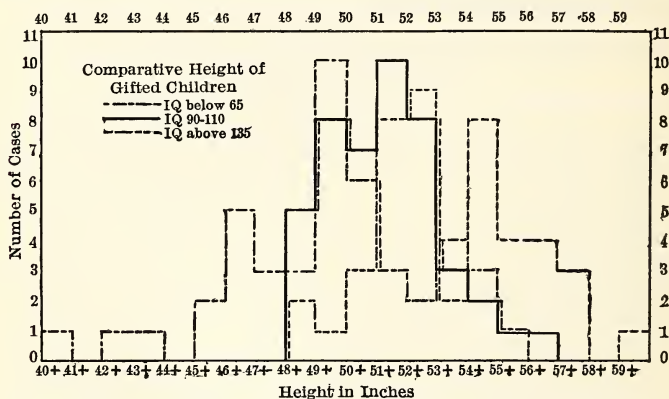


FIG. 40. COMPARATIVE DISTRIBUTION OF HEIGHT IN INCHES, FOR THREE GROUPS OF CHILDREN

Selected by mental tests, and matched child for child, by age, race, and sex. (From Hollingworth and Taylor, "Size and Strength of Children who Test above 135 I.Q." Reproduced by courtesy of the National Society for the Study of Education, from the *Twenty-Third Yearbook*.)

superior to other children. A study of the heights of 45 superior children (I.Q.'s ranging from 135 to 190; median I.Q. 151) was made a few years ago.¹ These measurements were then compared with the heights of 45 average children (I.Q. 90 to 110), and 45 below average children (I.Q. below 65). In order to have the three groups comparable, each mentally superior child was matched with a child having the

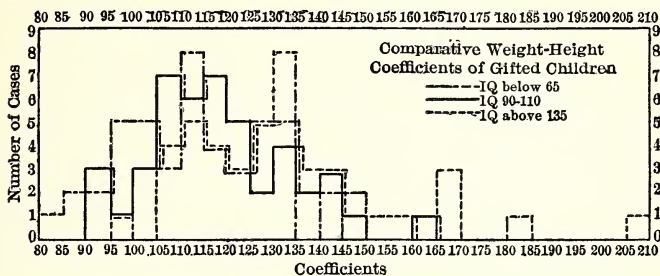


FIG. 41. COMPARATIVE DISTRIBUTION OF WEIGHT-HEIGHT COEFFICIENTS, FOR THREE GROUPS OF CHILDREN

Selected by mental tests, and matched child for child, by age, sex, and race. (From Hollingworth and Taylor, "Size and Strength of Children who test above 135 I.Q." Reproduced by courtesy of the National Society for the Study of Education, from the *Twenty-Third Yearbook*.)

same I.Q., age, race, and sex; the size was the only investigated variable. The results showed (see Figure 40) that the greatest heights were among the highest I.Q. group, and the least heights among the lowest I.Q. group. There was, as may be seen, a large percentage of overlapping.

The same study found that the weight-height coefficient ($\text{Wt.} \div \text{Ht.}$, sometimes used as an index of nutrition) was also in favor of the superior group. Thus, the superstition that superior children are, generally, frail and undernourished is unsupported by actual findings.

¹ Hollingworth, L. S., and Taylor, G. A. "Size and Strength of Children Who Test above 135 I.Q."; in *Twenty-Third Yearbook of the National Society for the Study of Education*. Public School Publishing Company, Bloomington, Illinois, 1924.

Other measurements,¹ such as breathing capacity, arm span, width of shoulders, width of hips, strength of muscles, and grip, show the mentally superior children to be superior in almost all physical traits. The general health of superior children as revealed by medical examinations² has also been found to be better than that of unselected children. Physical defects, both major and minor, as well as physical anomalies, are not as common as in unselected children.

4. *Abilities and interests of superior children*

School progress. It was found that the average gifted child of Terman's³ group entered school (above kindergarten) at $6\frac{1}{4}$ years, and low first grade was skipped by 21 per cent of the children. The entire first grade was skipped by 10 per cent. About 85 per cent of the gifted children were accelerated and not one was retarded, according to the usual standards obtaining in the public schools. Teachers' ratings of school work showed that the gifted children were usually doing a superior quality of work in the grades where they were located. The greatest superiority was found to be in "thought" subjects, and was zero in such subjects as penmanship, sewing, manual training, games, and sports. Only 1 per cent of the gifted children were reported to have a positive dislike for school. The liking was reported to be "slight" in 4 per cent, and "very strong" with 54 per cent of boys and 70 per cent of girls. Almost half of the gifted children learned to read before starting to school, and at least 20 per cent before the age of 5 years. Six per cent learned to read before the age of 4, and at least 1.6 per cent before the age of 3. Most of these children learned to read with little or no formal instruction.

School accomplishment. One of the outstanding facts in

¹ See Terman, *op. cit.*, chap. VII.

² *Ibid.*, chap. IX.

³ *Ibid.*, chaps. X and XI.

regard to the group of gifted children is that they attend school a much shorter period of time, yet accomplish much more in actual learning than the average school child. The actual length of time spent in school seems to have little influence in determining school accomplishment for these children. Often a superior child of 8 who has attended school only two years is able to pass tests (Stanford Achievement Tests) for the work of about five grades as well as the average unselected child when he is ready to be promoted to the sixth grade.

With the data of superior children, Terman computed the influence of length of school attendance and of intelligence upon educational accomplishment. Considering age, intelligence, and length of school attendance as the possible determinants of accomplishment, the correlation of any one factor with accomplishment can be computed by the partial correlation method. The correlations found were as follows:¹

School attendance vs. Spelling Q.....	$r = .041 \pm .066$
School attendance vs. Information Q....	$r = .003 \pm .067$
School attendance vs. Reading Q.....	$r = .009 \pm .066$
School attendance vs. Arithmetic Q.....	$r = .132 \pm .065$
School attendance vs. I.Q.	$r = .013 \pm .067$
I.Q. vs. Spelling Q.....	$r = .328 \pm .060$
I.Q. vs. Information Q....	$r = .457 \pm .052$
I.Q. vs. Reading Q.....	$r = .342 \pm .059$
I.Q. vs. Arithmetic Q....	$r = .261 \pm .062$

From these figures it may be inferred that school attendance, in the study made, had no appreciable effect on subject-matter accomplishment. The intelligence quotient,

¹ Terman, *op. cit.*, p. 305. Terman used 109 cases, having a chronological age of 10 to 11 at the time the achievement tests were given. The I.Q.'s of the cases ranged from 139 to 190; S.D. 10.44. Length of school attendance ranged from 2 to 6½ years; S.D. .858.

however, was an important factor in determining accomplishment.

In general, the study concluded, the superiority of the gifted children over unselected children of corresponding age, is very great in all fields of accomplishments tested, at all ages, and with both sexes. The average gifted child masters the subject matter of instruction to a point 40 per cent above his chronological age, but is usually held back to a point only 14 per cent above the norm for his chronological age. Moreover, the gifted children investigated showed the greatest superiority in general information, language usage, and reading, and least in history and civics. The achievement quotients of the gifted children were higher for ages eight to twelve than for younger or older children. Gifted boys excelled gifted girls in general information, arithmetic, and spelling, while the girls of ten and older were slightly superior to boys in language usage. When scores on the separate parts of the information test were compared, the boys were found to be markedly superior to the girls in science and history, and somewhat superior in language and literature. On information relating to the arts the girls did as well as the boys.

The teachers' marks, given on the basis of daily classroom work, were in many cases much lower than the accomplishment quotients of the gifted children would lead one to expect. In such cases it was inferred that either the teachers underestimated the children's accomplishment, or gave low marks as a penalty for lack of application to the set tasks of the school.

Specialization of abilities. In regard to the question as to whether the mentally-superior children are uniformly superior in all school work, or whether they show greater specialization than unselected children, the following findings were obtained:

Gifted children, as well as unselected control children, show such real and varied differences between abilities in school subjects as to warrant the conclusion that each child must be considered as unique with individual mental specializations. As a group, the gifted children show no greater unevenness of abilities than do unselected children, but the unevenness of the superior children is on a very much higher level. Case studies of gifted children show examples of definite specialization.

A significant lack of parallelism in development of abilities, especially in the cases of the younger children, indicated that the development of some of the mental abilities must be greatly facilitated by innate factors. The differences are too great to be accounted for by differences in training.

Scholastic interests. Terman found that gifted children are, as a rule, more interested in school subjects which are abstract, and less interested in the "practical" subjects. In subjects such as literature and dramatics they are relatively much stronger than unselected children, and much weaker in subjects such as penmanship, manual training, sewing, and so on. They express the same degree of preference for grammar. The average correlation between the gifted children's preferences for different subjects and the teachers' estimates of the quality of the children's work, in those subjects, was only .41.

The gifted girls showed a considerable resemblance (.70) to gifted boys in regard to school subjects found easy, but did not show much resemblance (.09) to the subjects found easy by the control girls. There was a greater similarity between sexes in the gifted group than in the control group.

Occupational interests. In the same study reported in the preceding paragraphs, it was found that gifted children

preferred occupations that rated higher on the Barr Scale¹ of Occupational Status than did unselected children, but the difference between the ratings of parents' occupations and children's preferred occupations was less in the gifted group than in the control group. The occupations of the fathers of the gifted children had an average Barr rating of 12.77 (occupation rating between *chef*, employed in large first-class hotels, and *editor* of small paper, considerable job work) as compared with 8.8 (occupation rating between *plumber*, average trained employee, and *gardening or truck farming*, owning and operating small plots) rating of the occupations of the fathers of the control group.

The average gifted boy is looking forward to an occupation which presents about the intellectual difficulties of high-school teaching, preaching, or industrial chemistry; the average control boy, to an occupation presenting the intellectual difficulties of a nurse, chef, or landscape gardener. Thus, when the occupations of the parents are kept in mind, the occupational ambitions of unselected children tend to be more extravagant than those of gifted children.

The only significant differences between the sexes was that the occupational choices of gifted boys rated somewhat higher than the choices of gifted girls.

Other investigations² of bright children's occupational preferences show us that, although on the whole gifted

¹ The Barr Scale Ratings of Occupational Status is an approach to rating the intelligence-value of occupations. A list of one hundred representative occupations, each definitely and concretely described, was prepared and submitted to thirty judges who rated them on a scale of 0 to 100 according to the grade of intelligence which each was believed to demand for ordinary success. The ratings were then distributed and P.E. values were computed for each occupation. The P.E. values were then taken to express the number of units of intelligence that was demanded for each occupation.

² Coy, G. L. *The Interests, Abilities and Achievements of a Special Class for Gifted Children*, Teachers College, Contributions to Education, no. 131. Columbia University, 1923.

children give preferences for literary, scientific, artistic, or professional careers, by no means all do so. Many of these children give ambitions which are below their capacity.

Musical sensitivity of gifted children. Hollingworth¹ gave five of the Seashore musical sensitivity tests to 49 children who tested above 135 I.Q. on the Stanford-Binet test. The median age of the children was ten years four months. From her study, the investigator reached the following conclusions:

1. Above the level of intelligence required to understand and execute the directions for taking the Seashore tests (mental age of about ten years), performance in pitch discrimination, perception of intensity, perception of consonance, and tonal memory is not symptomatic of intellectual endowment. Children testing in the highest 1 per cent for intellect, and achieving in school work generally according to expectation therefrom, distribute as random selections of Grade V children of their age do, in the sensitivities mentioned. Though they meet tests of intelligence as well as or better than average adults do, they meet tests of musical sensitivity only as well as average ten-year-olds can.

2. It is suggested by our findings that judgment of short intervals of time is correlated, though not closely, with intellect; that it is not an altogether independent variable. No doubt it is less a function of special anatomical structures outside the cortex than are the other forms of discrimination included in the Seashore tests.

3. Performance in tests of musical sensitivity is closely connected with birthday age, within a group of the intellectually gifted, and is not connected with mental age (except possibly in the case of judging time). Such performance is even less helpful, in identifying high degrees of intellectual endowment, than are measurements of physical size. As regards the latter the chances favor finding superior intellect in a tall, heavy child; but they neither favor nor disfavor the discovery of superior intellect in

¹ Hollingworth, L. S. "The Musical Sensitivity of Children Who Test Above 135 I.Q. (Stanford-Binet)"; in *Journal of Educational Psychology*, vol. 17, pp. 95-109. (1926.)

a child who is very sensitive to pitch, intensity, and consonance, or who is retentive of tones heard.

4. Since the intellectually gifted children are, as a group, larger than unselected children of the same age, it might be expected that they would excel in tests such as were given here, solely on the basis of a more advanced development of the special anatomical structures involved. Such is, however, not the case. Perhaps this means that the large children of our group are not merely *accelerated in development*, as some have surmised, but that they are *the large members of their species* — a distinct difference.

Play interests. In studying the play interests of gifted children, Terman assigned preference ratings to ninety plays, games, and amusements, basing the ratings on the extent to which gifted and unselected children said they liked and practiced them. Separate ratings were made for gifted boys, gifted girls, and for control boys and control girls. The gifted children showed a greater interest in activities that required thinking and that were mildly social and quiet than did the control children. A slightly less preference for competitive games was expressed by the gifted children. The gifted children also tended to prefer activities that were, in general, *increasingly* more popular for the ages eight to fourteen, rather than *decreasingly* popular for these ages.

From data on children's play life secured from both home and school it was found that gifted children play alone slightly more than do unselected children, they prefer playmates who are older than themselves, and they show much less sex preference in choosing playmates than do control children. Gifted girls show far less sex preference in choice of playmates than do gifted boys.

The companionship of gifted children is sought in school to about the same extent as that of control children, even though the gifted children are usually younger than their playmates. More gifted children were considered "dif-

ferent" or "queer" than control children. In regard to being teased by others or crying when they cannot have their way, there was little difference found.

A great many gifted children had imaginary playmates or imaginary countries, but whether in greater numbers than the control children was not discovered.

Other studies found that children rating above 170 I.Q. often show play interests which are uncommon for their years. Young children who are extremely gifted seem to have noticeable difficulty in play. Children tend to play with children of like *mental* age. The young genius in seeking the companionship of children almost twice his chronological age is repulsed on the ground that he is too little to play with; children of his own age are not capable of interesting themselves in the more complicated activities of a young genius.

Reading interests. From data obtained from 511 gifted and 808 control children, Terman found that gifted children, according to parents' estimates, read from about six hours per week at the age of seven, to twelve hours per week at the age of thirteen (mean numbers). According to teachers' estimates, 88 per cent of the gifted and only 34 per cent of the control children read more than the average child; none of the gifted and 22 per cent of the control children read less than the average. Moreover, the average gifted child of seven years reads more books in two months than the average control child of any age up to fifteen. Eight- or nine-year-old gifted children as a rule read three times as many books as the average child. Gifted children read over a considerably wider range than average children; they read more science, history, biography, travel, folk tales, informational fiction, poetry, and drama. In proportion to the total number of books read, the gifted read fewer books of adventure or mystery, and far less emotional fiction. Gifted boys read

about three times as many books of adventure or mystery as do gifted girls. Gifted girls read nearly five times as many emotional fictions as do the boys. With the exception of the *Book of Knowledge*, all of the twenty best-liked books for both boys and girls were fiction.

Fairy tales are actually disliked by some of the most intelligent children, and as a whole are not much liked by gifted children.

The gifted are omnivorous readers; however, it is not the quantity but the quality of books read that is characteristic of superior intellect.

5. *Character and stability of superior children*

Character. It is well recognized that intelligence is only one of the factors that determines man's behavior. It is fundamental in that a fair amount of it is necessary for even indifferently good citizenship, and a liberal amount of it is necessary for contributions to humanity. However, the possession of the highest degree of intelligence does not insure the greatest contributions or even good citizenship. Many exceptionally bright children (Miss Anna Gillingham described twenty-five of these cases) are completely unable to use their intelligence in adjusting themselves to their environment. Good citizenship demands that individuals school themselves to harmonious group living. Natural tendencies must be curbed; unnatural habits must be formed. The final set of habits formed to meet life's problems is known as *character*.

Tests for character. Character is rather difficult to measure objectively, yet tests have been devised that seem to measure it to quite some degree of satisfaction. Terman gave a battery of seven character tests to 532 gifted and to 533 unselected children. These tests consisted of two over-statement tests, a reading and a character preferences test,

and tests in social attitudes, trustworthiness, and emotional instability. The reliability of the battery was inferred to be above .75 and the validity above .60. Since we are inclined to doubt the objective measurability of character, brief descriptions of the tests used will be given to satisfy the reader in this respect.

The overstatement tests consisted in asking for statements as to whether one knows, and later checking these statements by requiring that one tell what he knows. Sample items follow:

Do you know who discovered America?

Do you know who was the prophet who spent the night in the lions' den?

Do you know how to find the square root of decimals?

Do you know what the receiving wires of a wireless are called?

Do you know how water enters the roots of plants?

Now add up your score. A PERFECT SCORE is 160 points.

MY SCORE IS

In the second part of the test the child was told to underline the correct word in such sentences as the following:

America was discovered by

Drake Columbus Balboa Cook

The prophet who spent the night in the lions' den was

Daniel Jonah David Joel

The square root of .0081 is

.9 .09 .009 9

The receiving wires of a wireless are called the

amplifiers detectors reflectors antennæ

Water enters the roots of plants by

capillarity osmosis evaporation solution

In the reading-preference test the child was given ten book titles, and was asked to rate them from 1 to 10 to indicate how well he would like to read the books. The following is one list of titles given:

-A Daring Rescue
-Roy Black, The Master Thief
-Captains of Great Teams
-Hobo Stories
-Running Away with the Circus
-The Adventures of Boys Who Became Great Men
-Summer Camp Adventures
-With the Gang in the Back Streets
-The Boy Inventor
-The Escape Through the Woods

The character-preferences test consisted of eight brief characterizations of a boy. The subject was asked to rate each boy from 1 to 8 to indicate how well he would like to have him for a chum. A few characterizations follow:

Dick joined the Boy Scouts as soon as he was old enough. He did not like it at first; the drill and the rules were hard. Now he is a troop leader and is planning a camp in the mountains next summer.

Ray Stevens is at school now, but he is anxious to get out. He wants to become a taxi-driver. Ray says that taxi-drivers have an easy time; they need not work so hard, and they go about a great deal.

Bill Evans is fourteen, and is the leader of his gang. He always manages to get his men home safely after they have had a good time around the pool room. Just last week they saw Tom Mix at the movies without paying.

Ted is a poor boy; and, although he is at school, he must help provide for the family. Ted studies hard and also plays on the team; he wants to become a doctor.

Social attitudes and trustworthiness. The social-attitudes test listed twenty-four things or ideas, each followed by four statements expressing various kinds of reactions to the thing or idea presented. The child was asked to check the one statement that most nearly told how he felt about it. Samples are given:

CHUMS:It is hard to go without them.
.....You cannot always trust them.
.....They sometimes squeal on you.
.....It is best to have them in your gang.

TEACHERS:They work hard.
.....They know they can punish you.
.....They are not fair to you.
.....They are kind of cranky.

BOY SCOUTS:They have too many rules.
.....They have to drill too hard; it is no fun.
.....They are regular fellows and have lots of fun.
.....They are like sissies.

POLICEMEN:They have it in for the kids.
.....They are glad to help you out.
.....It is fun to fool them.
.....They are just big bluffs.

In these last two tests, competent judges determined the correct answers.

In the trustworthiness test the child was asked to study a figure (Fig. 42), and then, with eyes closed, to place a cross in each circle, and to record his successes out of five trials. A second part of the test required the child, with eyes closed, to trace around squares, as shown by the arrows, without touching the sides. The child recorded the number of successes in five trials.

In both parts of this test, recorded successes are largely due to the child's peeping during the test.

Emotional stability tests. The test for emotional stability, based on the Woodworth-Cady Questionnaire,¹ asked the child to answer some questions as truthfully and honestly as he could. Most of the eighty-five questions asked per-

¹ Devised in 1918 to identify soldiers having psychotic tendencies. The authors sifted leading books of psychiatry for symptoms most generally associated with psychopathy. Questions were then built around these symptoms.

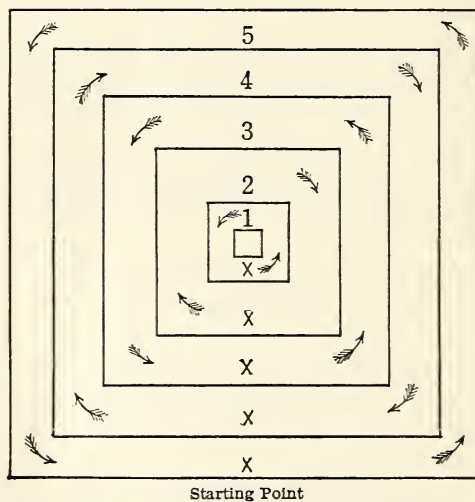
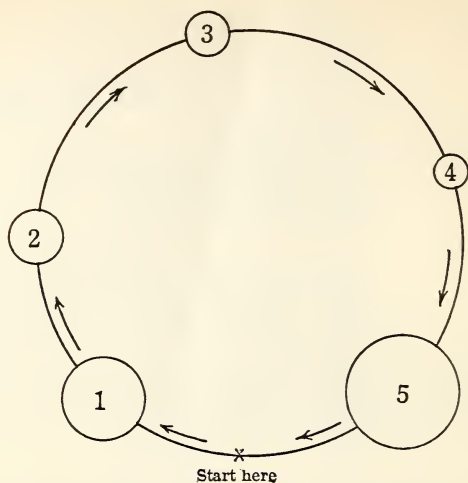


FIG. 42. FIGURES FROM VOELKER-CADY TEST FOR TRUSTWORTHINESS
(Reduced in size.)

tained to symptoms of stability; some questions were inserted for "padding." Some of the significant questions are listed:

Are you happy most of the time?

Are you afraid in the dark?

Do you get tired of people easily?

Do you make friends easily?

Have you a habit of biting your finger nails?

Did you ever have the habit of twitching your head, neck, or shoulders?

Do you sometimes cry yourself to sleep?

Can you stand the sight of blood?

Did you ever feel that you were very wicked?

Do you sometimes wish you had never been born?

In this battery of character tests, the gifted children showed a significant superiority over the control group; the significance obtained for both sexes and at all ages. Figure 43 shows Terman's curves based on the age-means of the total character scores for the gifted and for the control groups, separately by sex. On the separate tests, Terman tells us, from 60 to 80 per cent of the gifted equal or exceed the mean of the control group. On the total score of the combined tests, 85 per cent of the gifted children equal or exceed the mean of the control children.

This study also shows us that the gifted child of nine has reached a level of character development corresponding in general to that of an unselected child of fourteen years. Gifted girls make a better average score than gifted boys in most of the tests. In the control group there is very little sex difference. However, the boys of both groups made better showing in the honesty test than did the girls. The adolescent spurt in character developed about a year earlier in girls than in boys. For the most part sex differences in the variability of scores earned in these tests were small and inconsistent.

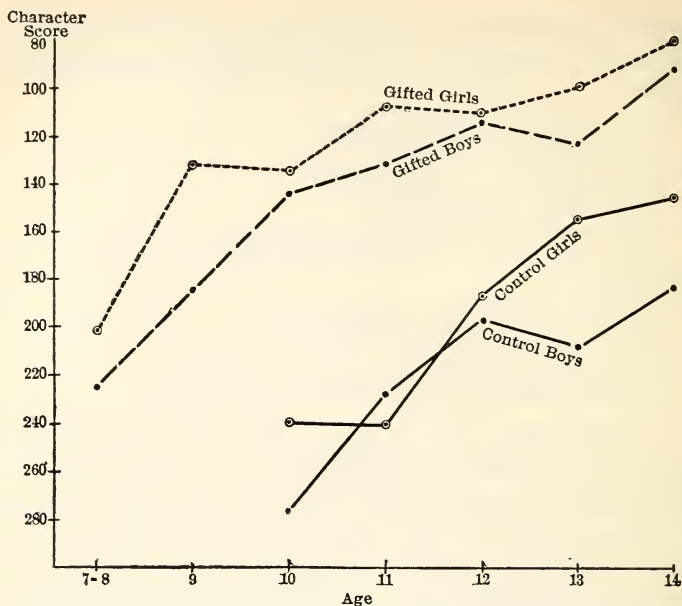


FIG. 43. MEAN TOTAL SCORES OF GIFTED AND CONTROL CHILDREN, BY AGE, ON SEVEN CHARACTER TESTS

Note: Small scores are "better," large scores "worse." (From Terman's *Genetic Studies of Genius*, vol. 1. Reproduced by courtesy of the Stanford University Press.)

The general conclusion derived from the study was that in the traits that these tests measured, the gifted children were decidedly superior to the control children, and that this superiority was greater for girls than for boys.

Trait ratings. Terman again furnishes us with the most extensive and conclusive study of various traits of gifted children. Parents and teachers of 600 gifted and 500 unselected children were asked to rate the children on twenty-five traits, falling roughly into seven groups: intellectual, volitional, emotional, moral, social, physical, and special-ability traits. The graphic rating-scale method was used. (See Fig. 44.)

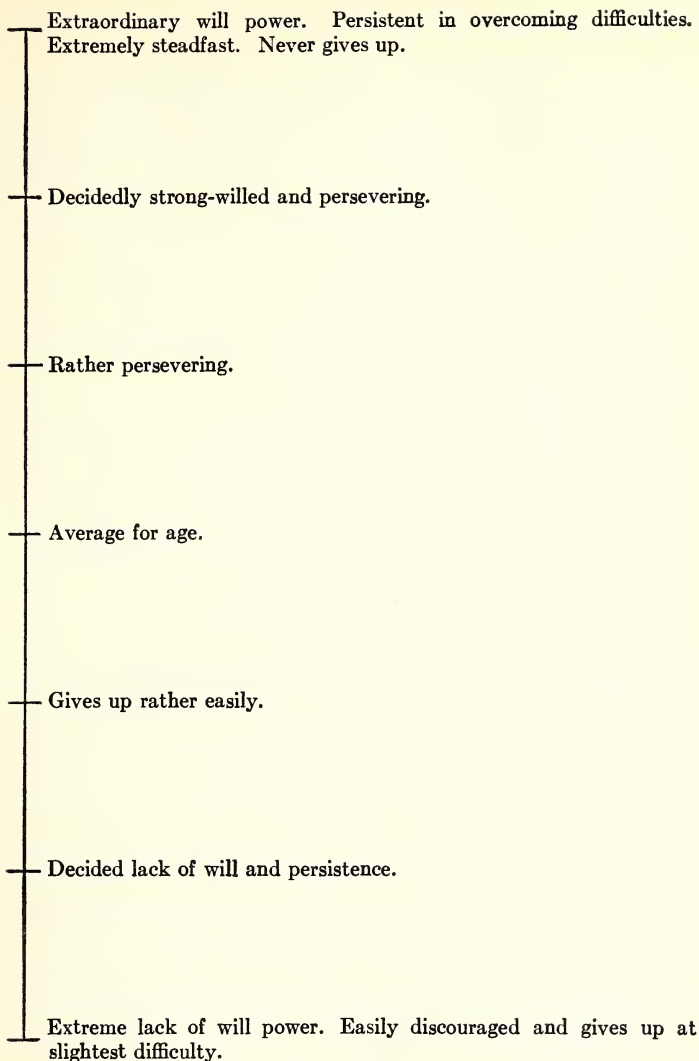


FIG. 44. TRAIT 5. WILL POWER AND PERSEVERANCE

Was your judgment on the above trait very certain, fairly certain,
rather certain, very uncertain? (Underline.)

There was a striking agreement between parents and teachers as to the traits in which the gifted excelled. The order, according to the degree of superiority of the gifted children, was: (1) intellectual, (2) volitional, (3) emotional, (4) moral, (5) physical, (6) social traits. Mechanical ingenuity was the only trait on which the control group was rated higher than the gifted group.

On an average, parents rated the gifted children slightly higher than did teachers, and girls were rated, by both parents and teachers, slightly higher on a majority of traits than were boys.

In an earlier study of fifty gifted children, Terman obtained teacher ratings on various personality traits. The estimates were graded in five degrees, with 3 representing the average of the trait rated. One represented the highest and 5 the lowest. The mean ratings assigned to these gifted children were as follows:

Sustained attention.....	1.44	Unselfishness.....	1.73
Will power.....	1.50	Sense of humor.....	1.80
Persistence.....	1.51	Evenness of temper....	1.90
Dependability.....	1.56	Intellectually modest..	1.90
Studiousness.....	1.58	Emotional self-control..	1.94
Cheerfulness.....	1.61	Physical self-control...	1.94
Obedience.....	1.61	Initiative.....	2.06
Conscientiousness.....	1.61	Social adaptability.....	2.24
Courage.....	1.62	Leadership.....	2.41

As these means show, these gifted children were rated above average in each of the desirable character traits listed. Only a few children were rated below average, and the great majority were rated decidedly above average.

In conclusion it must be added that gifted children are almost never found among offenders in juvenile courts. A few children testing up to about 115 I.Q. have been found in such places, but children testing above 130 I.Q. are almost never encountered.¹

¹ In a footnote Hollingworth says that in the cases of Leopold and Loeb,

6. *The school training of superior children*

The organizing of classes for gifted children is a very recent development in education, and is still attended by experimentation. The problems of curriculum, rate of promotion, administration, methods of teaching, qualification of teachers, and course content material are subject to wide variations, yet there is more or less agreement in regard to underlying principles.

Types of training. Enrichment of curriculum, rapid progress, or segregation in special classes for only gifted children are advocated by modern educators. The arguments extended by early objectors for these special methods, namely, that the attainments of the bright children are needed to stimulate the progress of normal children, or that an I.Q. aristocracy would be encouraged among school children, are groundless. Even the objections on the basis of the discrepancy between physical and intellectual maturity that would result in permitting the superior child to progress at his individual rate is no longer tenable. A child with an I.Q. of 180 could easily enter college at twelve, and for him there would undoubtedly be deprivations of highly desirable personal contacts that he could obtain if he would enter two or three years later. Children of I.Q.'s above 175, however, are so rarely encountered that their problems must be handled individually, as each case thus far encountered has been. Children with I.Q.'s of 140 or somewhat above can be ready to enter college by the time they are fifteen or sixteen, about three years accelerated. The physical discrepancies between these children and the eighteen-year-old normal-college student are not very conspicuous, and have not caused serious problems of adjustment in the past. In the

in Chicago, the I.Q.'s of the offenders were not published, but from scholastic achievement high I.Q.'s would be inferred. See Hollingworth, L. S. *Gifted Children*, p. 142. The Macmillan Company, 1929.

earlier years of the gifted child's life the physical discrepancy is very noticeable, and often involves serious problems when an isolated gifted child is promoted at his own rate of progress. With the organizing of classes for the gifted, these problems, too, disappear. Some specialists urge time-saving by rapid promotions in pre-college education, and regular or longer attendance in professional schools, because the gifted mind can spend unlimited time in specialization.

Rapid promotion is urged by many educators because it is easy and inexpensive. The more thoughtful are more inclined to encourage an enrichment of program for the gifted children, thus keeping their intellectual powers active and in association with children who are mentally and physically their equal. Social ostracism, which is the usual fate of the very young high-school child, is thus avoided. Many suggestions in regard to the specific ways in which the curriculum may be enriched are offered. The following are among the most commonly used:

1. Reduction of drill, explanation, and development.
2. Definite instruction in how to study independently.
3. Problem-project and seminar methods of instruction, rather than question-answer or recitation methods.
4. Encouragement of all forms of creative work — writing of plays, stories, poetry, and editorials. Publication of newspapers; organization of literary and civic clubs; presentation of plays, and pageants.
5. Instruction in foreign languages.
6. Trips to libraries, art galleries, museums, factories, and various business and commercial centers of the community.
7. Definite training in leadership through direction of school projects, committee work, and holding offices in clubs or societies.
8. Courses for æsthetic appreciation in music, art, dramatics, etc.
9. Special courses in music, art, and drawing for those possessing special aptitudes in these lines; band and orchestral work also.

10. Provision for special physical exercises and instruction in outdoor games.
11. Nature-study trips under guidance.
12. Lectures by eminent people, specialists, travelers, artists, etc.
13. Good motion pictures and plays.
14. Training in all phases of manual work suitable to the physical development of the child.
15. Unlimited contact with the best books.

The teacher of gifted children. The securing of competent teachers for gifted children is often a real difficulty. Strange as it may seem, many teachers harbor a subtle jealousy for the gifted children. Successful teaching experience with normal children does not insure successful work with gifted children. Different modes of attack and guidance are required for the gifted children. In general, an approach to seminar methods has been found most successful. Concrete constructive projects, desirable for the normal, are often cumbersome and unnecessary for the gifted whose rich imaginative powers can create mentally, magnificently, in minute detail. Bodily and manual construction constricts and retards mental progress. Drill, for the gifted, is reduced when unlimited repetition is unnecessary. This does not mean that drill is eliminated, or that the gifted child will permit himself to be bored by it when he sees the necessity of it, but drill of the nature and extent required for normal children is not required by the gifted children.

CASE STUDIES: GIFTED CHILDREN

The following are case studies of modern gifted children. In each case the child was exceptional in general intelligence and also received very careful training. These particular cases are selected because the individuals will soon be mature and the outcomes of their promising childhood can be noted. Bear in mind, in considering each case, Galton's statement

that early manifestations of genius are not incompatible with prolonged and even late development. Haydn, Beethoven, Michelangelo, Milton, Goethe, Voltaire, and Newton are examples of a lengthy developmental process.

Case 1

The case. Winifred Sackville Stoner could talk and knew colors at six months of age. At sixteen months she could read, and at two years she wrote her own name on hotel registers and began keeping a diary. At three years she amazed adults by her spelling, and learned to use the typewriter as an aid in learning to spell and to memorize. At four, she learned the Latin declensions and conjugations, and received a diploma in Esperanto. When five years of age she wrote stories and jingles for newspapers, spoke eight languages, translated "Mother Goose" rhymes into Esperanto, and learned to waltz, two-step, and three-step. At seven, she learned the Greek, Roman, and Scandinavian mythology, and at nine, passed the entrance-examination to one of the largest Western universities. At eleven, she began to specialize in music, art, and dancing continuing her academic work and physical training. At twelve, she was pronounced to be ready for graduate work in any university in the country. Winifred is about thirty years of age at present.

Query. From the statement given above, what predictions would you make as to the future of this person?

Case 2

The case. E. B.¹ has been reported to have the highest I.Q. attained by any child on the Stanford-Binet scale. At the age of five years nine months she rated 175 I.Q., and at the age of eight years eleven months made a rating of 214 I.Q. This discrepancy between her I.Q.'s is indicative of error, but the child undoubtedly has extremely high intelligence.

When E. B. was three years old, it was discovered that she knew her alphabet. It seemed that she learned this by asking questions about printed signs. She had very little formal instruction at home, for her mother was active in newspaper work most of the time. At

¹ From Stedman's *Education of Gifted Children*, pp. 58-69. Copyright, 1924, by World Book Company, Publishers, Yonkers-on-Hudson, New York.

four, E. B. entered kindergarten, attending six weeks. At four and one half, she was placed in a convent because her mother went to France as a war correspondent. The child was not enrolled in classes, but was permitted to sit with the high first grade when she wished, because her little chum sat there. At the end of four months it was discovered that E. B. could read any page in the reader which had been used as a text, and any page in the public school first reader which she had never seen before. She was then placed in the second grade. One week after entering the second grade in the following September, she was promoted to high second, although she had not studied at all during the summer. She had read extensively, however, during the summer. At the close of the school year, at the age of five years and nine months, E. B. was promoted to the fourth grade.

Before this child was six years old she had read practically every book listed by the public library at Des Moines for children for the first six grades. Her favorite books at the age of nine years included: Barrie's *The Little Minister*, *Sentimental Tommy*, and *Tommy and Grizel*; Hugo's *Les Misérables*; Dickens's *Oliver Twist*, *Our Mutual Friend*, and *David Copperfield*; Kipling's short stories and complete poetical works; Dumas's *The Three Musketeers*; Eliot's *Silas Marner*, and *The Mill on the Floss*; Bunyan's *Pilgrim's Progress*; Hutchinson's *If Winter Comes*, and *This Freedom*; Shakespeare's *Midsummer Night's Dream*, *The Tempest*, and *Romeo and Juliet*; Masfield's *Daffodil Fields*, of which she memorized long passages; Tennyson's poems; Coleridge's *Ancient Mariner*; *The Rubáiyat of Omar Khayyám*; Emerson's essays; and standard books of Greek, Roman, and Scandinavian myths. This is only a sampling of a very incomplete list of her reading.

Until E. B. entered an opportunity room, she was unpopular with children. Although she seemed to be eager to be friendly, she was shy and was unable to make social adjustments. Under the direction of the teacher, E. B. was gradually included in the children's activities. She has excellent health. Her ambition at ten years of age is to be a writer of fiction and poetry. She "philosophizes" in her writing, and is much more interested in the abstract than the concrete. E. B. is now about sixteen years of age.

Queries. What predictions would you make for the future of E. B.? Would you give E. B. any different type of training from that she is now receiving? If so, of what type? Why?

Case 3

The case. Ida Jane, at four years of age, is found to have an I.Q. of 168 on the Binet scale. When three years old the child was able to recite many long poems. She talks and acts like a mature person. In answer to the Binet item, "How many fingers have you on your left hand?" she answered, without looking at her hands, "Why, the same amount, Miss S., that I have on my right hand. Everybody has, you know." During the test procedure, she became rather troubled, and finally said: "You said this was to be a game. I wouldn't call it a game; it is more like school work."

When Ida Jane recited one of Edna St. Vincent Millay's poems, the writer asked whether she liked women poets better than men poets. Ida Jane reflected a moment, and then said, "I know only three women poets [naming them] and ever so many men poets, so I guess I like men poets better because there are more of them."

Ida Jane is an only child. Her father, a Unitarian minister, writes poetry of superior quality; her mother, a former college teacher, spends practically all of her time in training her daughter. The household is only incidentally established for the adults; Ida Jane's interests and training monopolize everything.

Ida Jane is a picture of health, but she often shows evidence of nervous instability. When tired or thwarted in her activities she will jump up and down, scream, and shake her hands rapidly. She does not play happily with children of her own age, not so much because her play activities are too mature, but because she wants to direct all their activities and wants her own way in everything. The child is left-handed, but is being taught to use her right hand.

Query. What training would you suggest for Ida Jane?

SELECTED REFERENCES

1. Clarke, E. L. *American Men of Letters*. Longmans, Green and Company, 1916.
2. Galton, Francis. *Hereditary Genius*. The Macmillan Company, 1914.
3. Hollingworth, L. S. *Gifted Children*. The Macmillan Company, 1926.
4. Hollingworth, L. S. "Introduction to Biography for Young Children Who Test Above 150 I.Q."; in *Teachers College Record*, 1924.

5. Pearson, Karl. *Life, Letters, and Labors of Galton*. Cambridge University Press, 1914.
6. Stedman, L. M. *The Education of Gifted Children*. World Book Company, 1923.
7. Terman, L. M., et al. *Genetic Studies of Genius*, vols. 1 and 2. Stanford University Press, Stanford, 1925.
8. *Twenty-Third Yearbook* of the National Society for the Study of Education. Public School Publishing Company, Bloomington, Illinois, 1924.
9. Woodrow, Herbert. *Brightness and Dullness in Children*. J. B. Lippincott Company, Philadelphia, 1923.
10. Woods, F. A. *Mental and Moral Heredity in Royalty*. Henry Holt and Company, 1906.

CHAPTER IX

SPECIAL TYPES OF GIFTED CHILDREN

The Poet... is made by miracle from his mothers wombe, and like the Diamond onely polished and pointed of himselfe, disdaining the file and midwifery of forraine helpe.

Hence *Tullie* was long ere he could be deliuered of a few verses, and those poore ones too; and *Ovid*, so backward in prose that he could almost speake nothing but verse. And Experience daily affordeth vs many excellent yong and growing wits, as well from Plow as the Pallace, endued naturally with this Diuine and heauenly guift, yet not knowing (if you should aske the question) whether a *Metaphore* be flesh or fish. — HENRY PEACHAM, *Of Poetrie*, from *The Compleat Gentleman*.

IN the preceding chapter we have been dealing with those children who are gifted with intelligence — general or abstract intelligence, perhaps; in this chapter we shall deal with children gifted in certain special ways. That there are individuals gifted with certain specific capacities, and that the evidences of these capacities are early manifested, has been shown in the study of the childhood of geniuses. It is, perhaps, safe to say that real genius, in any line, must be accompanied by superior general intelligence. How high an intelligence is necessary for genius in special lines has not been estimated. Cases of children gifted in specific traits with general intelligence decidedly below average (often even in the feeble-minded class), have been reported in the literature of specially talented children. None of these cases, however, attain the rank of genius.

1. *Musically gifted children*

Examples from biography. Biographical studies of the world's greatest musicians report that these geniuses often showed their specialization when scarcely more than babies. Mozart's musical talents, we are told, were definitely demon-

strated by the time he was three years of age. He was taught to play the clavier during his third year and soon played exceptionally well.

Cox¹ has summarized Mozart's progress in music, as follows:

When Mozart was 7 his first published work appeared — 4 sonatas for piano and violin, one of which showed especially remarkable taste. Between the ages of 7 and 15 he composed works for pianoforte and violin, pianoforte concertos, masses and church music, 18 symphonies, 2 operettas, and at the age of 14, an opera. When he was 12 his first operetta was performed. At 13 he received an appointment as grand ducal concert master (without salary), and in his first year of office he composed 20 numbers. At the age of 14 his first Italian opera was presented with great success. During these years his musical genius was so prolific that his fingers ached with the work of committing his ideas to paper. At 16 he received his first salary. Mozart was a brilliant executive artist as well as a great creative genius. His first musical tour was undertaken at the age of 6, when he visited Munich and met there with a very favorable reception. By his 8th year two more successful tours had been made, the first to Vienna and cities en route, the second through Germany.... Mozart's letters show the characteristics of an average pre-college student.

When he was 3 or 4, Mozart began to invent musical ideas.... Even at that early age he could retain musical passages that he had heard. On one occasion before his 5th birthday, he learned at half-past-nine at night and in half an hour a minuet and a trio, pieces requiring independence of the two hands and some musical comprehension. Before he was 6 Mozart had begun to insist upon the presence of real connoisseurs whenever he played.... At 7 his extraordinary sense of absolute pitch was discovered, as well as remarkable skill with the violin and the organ, which he had never been taught.... Locked up for a week by an incredulous archbishop, and required to prove his ability to write an oratorio without outside aid, Mozart (aged 11) achieved a brilliant triumph, a mature musical composition although written with blotted notes in a childish hand.

¹ Cox, Catharine M. *Genetic Studies of Genius*, pp. 593-94. Reproduced by courtesy of Stanford University Press.

Music was Beethoven's one interest from earliest youth. His father gave him lessons upon the pianoforte and violin during his earliest childhood, and from his sixth year gave him daily lessons. Young Beethoven was required to practice, "in spite of his tears."

The genius of all musically gifted children is not invariably recognized at so early an age. Wagner's mother had not seen anything in her son that would indicate any musical talent, even by the time the boy was nine years of age.

Training vs. capacity. The training and forced application to music demanded of young Beethoven would not have resulted in developing a genius had innate capacity not been present. Beethoven's case, as well as Fritz Kreisler's, is often given as an example of the potency of early training. Early training of the gifted children is important in developing genius, but no amount of training can develop a child without innate capacities into a genius.

Analysis of musical capacity. Detailed analyses of musical talents have been made in order to determine the basic elements indicative of musical capacity. Determination of these basic elements enabled investigators to devise tests that would discover the presence of musical capacity at a very early age.

One of the earliest studies¹ of children extremely gifted in music analyzed eight distinct traits common to musically gifted children. On the basis of these traits the investigator soon proposed eight tests that could be used to identify the musically gifted children. The tests proposed were for: (1) the sense of rhythm, (2) absolute pitch, (3) octave recognition and transposition, (4) relative pitch, (5) harmony and transposition, (6) memory of a melody, and (7) playing by ear. This study also emphasized the fact that the child's

¹ Révész, G. Nyriegyhazi; *Psychologische Analyse eines musikalisch hervorragenden Kindes*. Veit, Leipsig, 1916.

intelligence, interest, and "artistic nature" must be taken into account.

Seashore ¹ later made a more complete inventory of musical talent, and devised five phonographic tests whereby the child's musical capacities could be determined and measured under standardized conditions. The five tests are for pitch, intensity, time, consonance, and tonal memory.

Individual differences in musical sensitivity. The elements of musical sensitivity are by no means possessed in equal quantities by an individual. An individual with excellent sense of rhythm may have a poor sense of consonance. The sense of time and the sense of pitch seem to be largely independent of each other. Most individuals possess the elements in moderate degree. The distribution of musical abilities, like other traits, shows a general tendency toward approximating the normal-frequency curve. The child who combines all the necessary elements in high degree is the one that can be developed into a musical artist.

Correlation between musical capacity and general intelligence. Early studies of musical talent and general intelligence reported a positive correlation between the two. That is, the average of those children graded as "musical" on the basis of grades received in singing was higher than that of children classed as "semi-musical," and much higher than the average of the children classed as "unmusical." However, in the early studies the awarding of grades was largely subjective. Later investigations, utilizing standardized objective tests of musical abilities and of general intelligence, found that the correlations closely approached zero. Hollingworth ² reported the case of a ten-year-old boy who

¹ Seashore, C. E. *The Psychology of Musical Talent*. Silver, Burdett and Company, New York, 1919.

² Hollingworth, Leta S. *Special Talents and Defects*, p. 179. The Macmillan Company, 1923.

ranked in the top percentile in general intelligence, yet in musical capacities he ranked in the lower percentiles. An opposite condition was that of the fourteen-year-old girl of average general intelligence, with superior rating in musical capacity and in drawing.

In order to attain eminence in music, a high degree of general intelligence is, perhaps, necessary.

The inheritance of musical ability. An investigator¹ tested, objectively, eighty-five members of six unrelated family groups, each group having a person conspicuously recognized as a musician. A questionnaire study covering musical education, musical activity, musical appreciation, musical memory, and musical imagination supplemented the objective testing. On the basis of the study it was concluded that musical talent is inherited. The investigator also tried to determine the results of mating of musical with musical, musical with unmusical, and of unmusical with unmusical. On the basis of the limited cases the following tentative conclusions were given:

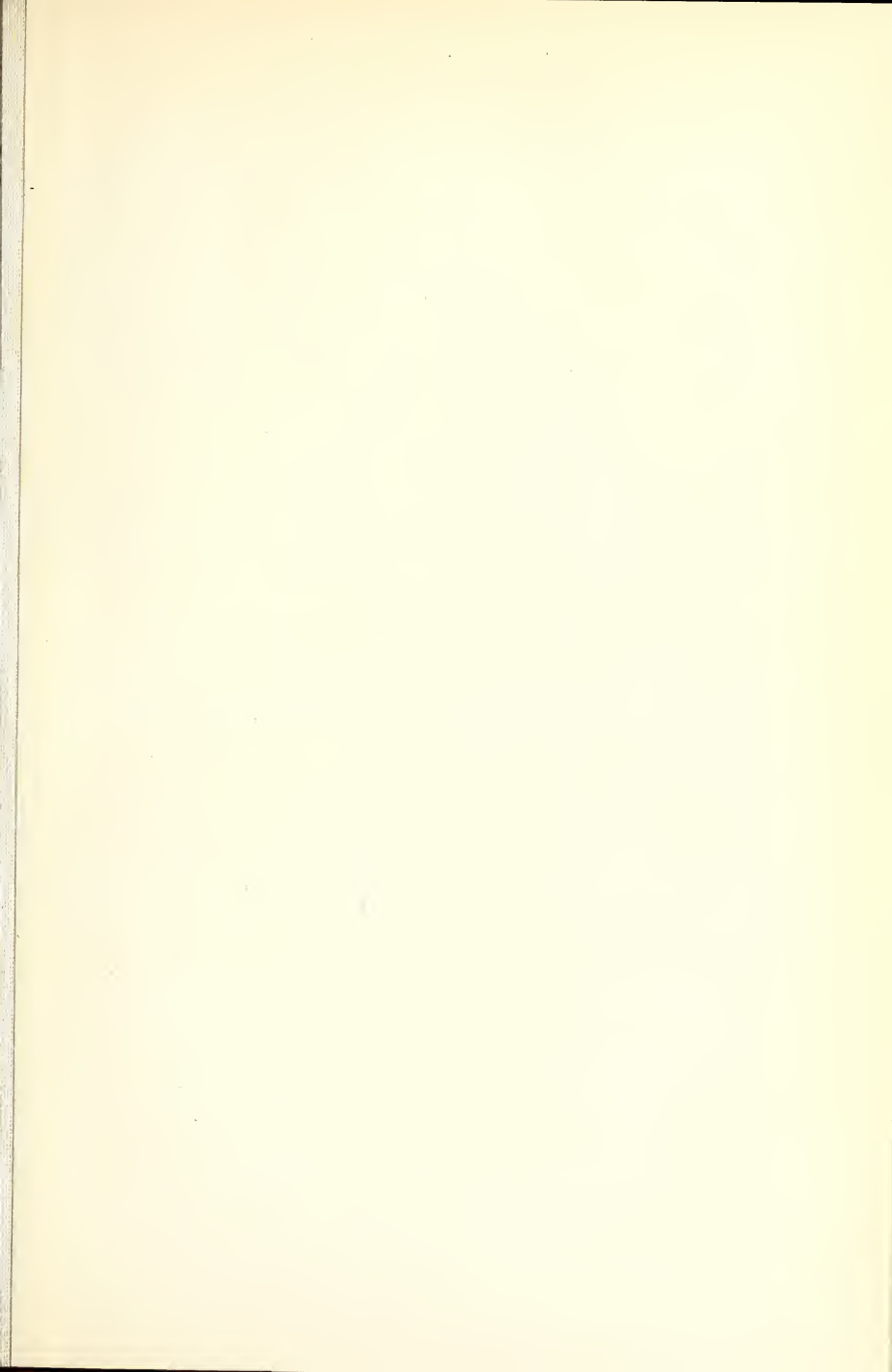
Those parents who are musical and whose ancestry is musical on one or both sides tend to have musical children; those parents who are not musical and have a non-musical ancestry on both sides tend to have non-musical children; those parents, one of whom is musical with musical ancestry, the other non-musical of non-musical ancestry, have children of both types.

And again, in the general summary:

The harmony of the results with certain Mendelian laws in the family-distribution tables of assumed gametic formulæ is not improbable.

The Bach family. This family, of which Johann Sebastian was the most noted, is an outstanding illustration of inheritance of musical ability. A study of the Bach family tree

¹ Stanton, H. M. "The Inheritance of Specific Musical Capacities"; in *Psychological Monographs*, vol. 21, no. 1. Princeton, New Jersey, April, 1922.



<p>1 Hans Bach 1620 —?</p>	<p>2 Wit Bach d. 1619</p>	<p>4 Lips Bach, d. 1620 also a "player"</p>	<p>6 Wendel</p>	<p>7 Lips</p>	<p>11 Jacob Cantor at Stein- bach</p>	<p>22 Johann Ludwig Cantor and choir- master at Mei- nigen</p>	<p>40 Samuel Anton, 1713-81 Organist</p>	<p>49 Johann Phillip, 1755-1846 Organist</p>
						<p>23 Johann Michael, Organ builder</p>	<p>41 Goldlieb Friederich, 1714-85 Organist</p>	
					<p>12 Johann Christopher, 1648-1702 Organist and com- poser. Married Elizabeth Wede- man; see next below</p>	<p>24 Johann Friederich Organist at Mühlhausen</p>		
						<p>25 Johann Christopher Music teacher</p>		
						<p>26 Johann Nicholas, 1669-1753 Jena University organist, com- poser</p>		
					<p>13 Johann Michael, 1648-94 Organist at Erfurt and com- poser. Married Katrina Wede- man, sister of Elizabeth, above</p>	<p>27 Johann Lois</p>		
						<p>28 Maria Barbara, wife of 30, below</p>		
					<p>14 Johann Gunther Organist</p>		<p>42 Wilhelm Friedmann, 1710-84. Organist at Halle and Dresden</p>	
					<p>15 Johann Christopher, 1645-93 Court musician</p>	<p>29 Johann Ernest Organist</p>		<p>43 Carl Phillip Emanuel Organist at Berlin and Hamburg</p>
						<p>30 Johann Sebastian</p>		<p>44 Bach</p>

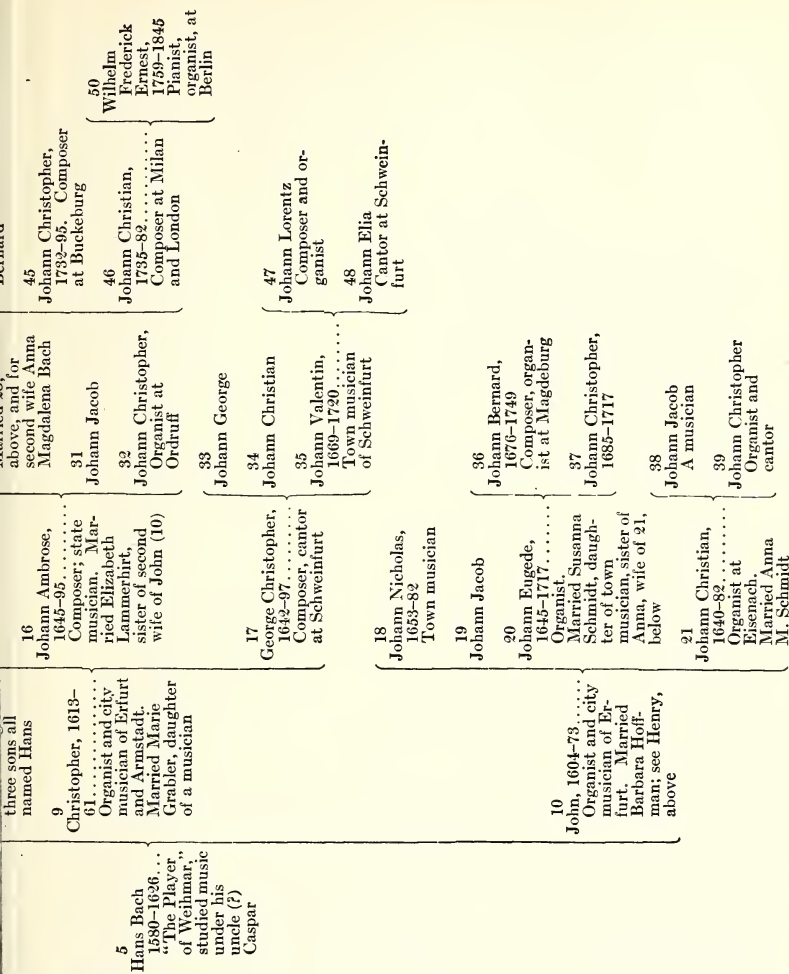


FIG. 45. THE RELATIONSHIPS OF THE MORE NOTED BACHS



(see accompanying chart, Fig. 45) will show the constant recurrence of organists, cantors, and town musicians for successive generations. In the course of six generations there appeared fifty-seven musicians of repute, twenty-nine of whom were really noted.

2. *Children especially gifted in art*

Ability in drawing. The elements basic to art, painting, and drawing, have not been analyzed as extensively as have those of music. One of the best studies¹ of persons especially gifted in the art of drawing led the investigator to make the following classification of the characteristics relating to ability in drawing:

1. The ability mentally to note a visual form, and, by certain lines and areas, to reproduce it or significant features of it.
2. Ability to observe.
3. Ability to select from a complex visual situation the most representative and the most beautiful aspects.
4. Memory for visual forms.
5. Ability mentally to manipulate visual forms.
6. Ability to control hand movements in accordance with visual percept or image.
7. Ability to invent, to bring together into new artistic combinations the elements of different visual experiences.
8. Ability to judge the beautiful in line, form, color, and composition.
9. Ability to discriminate differences in color.
10. Ability to discriminate differences in visual magnitude.
11. Acuity of vision.
12. Interest in the act and products of drawing.
13. General intelligence.

Objective tests for abilities in visual art. Various rating scales² for judging children's drawing have been available

¹ Ayer, F. C. *The Psychology of Drawing*. Warwick & York, Baltimore, 1916.

² Thorndike, 1912; Kline-Carey, 1922; Child Study Committee, 1914; Providence, 1926; Crow, 1926.

for some time. These scales test achievement, and a child of superior art ability, but with no training, will not do as well as the less-gifted child who has had training.

Tests designed to measure innate abilities rather than the product of abilities have been available but a very short time; the first of these appeared but a few years ago.¹ In general, these tests seek to measure ability in art by measuring such abilities as visual memory of proportion, observation, analysis, originality, recognition of æsthetic proportion, and discrimination of color. A few test items of the Lewerenz Art Tests² are given to show the general plan of the tests. (See Figs. 46 to 50.)

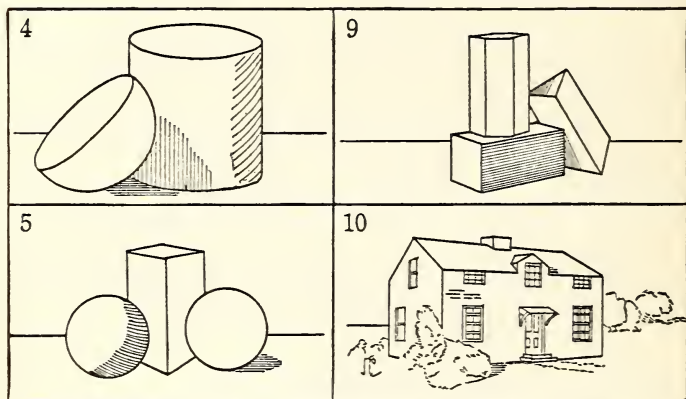
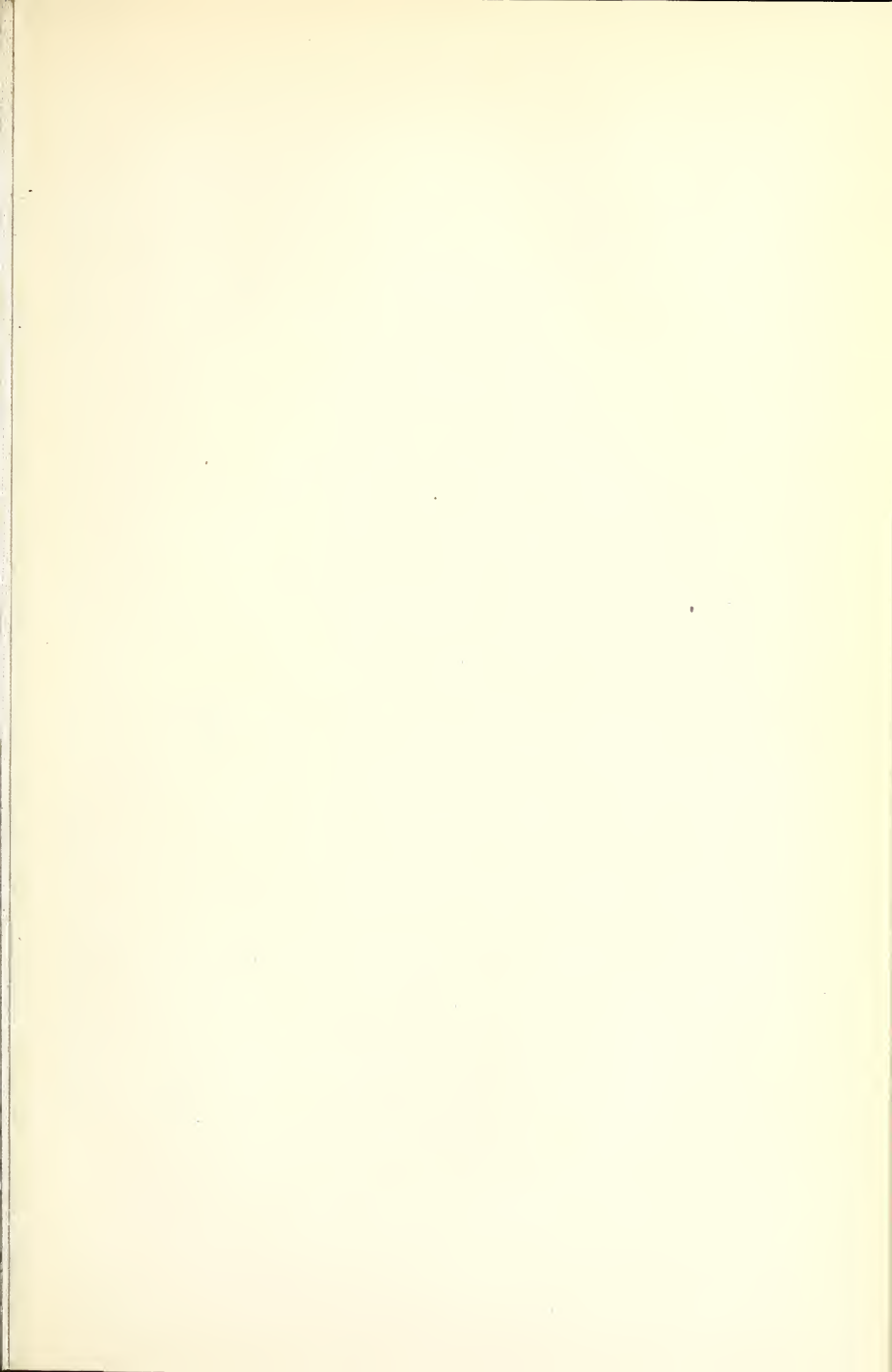


FIG. 46. TEST FOR OBSERVATION OF LIGHT AND SHADE

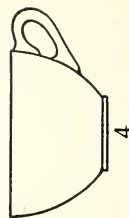
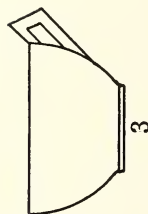
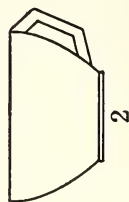
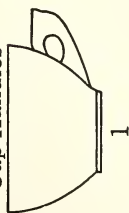
Recognition of proportion. In this test, a series of four designs or pictures are presented, each series including figures from bad to good in shape. The child is asked to pick out the one he likes best.

¹ Lewerenz, A. S. *Tests in Fundamental Abilities of Visual Art*. Research Service Company, Los Angeles, 1927.

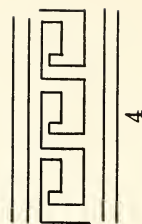
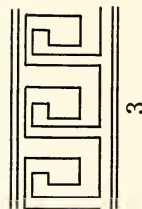
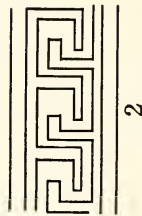
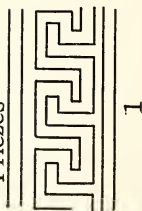
² Acknowledgments are made to A. S. Lewerenz and to the Research Service Company, for permission to print test items.



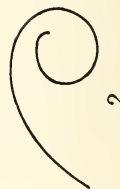
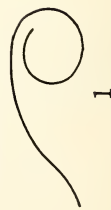
Cup Handles



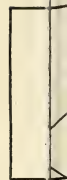
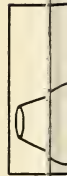
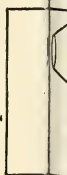
Friezes



Curves



Composition with one object



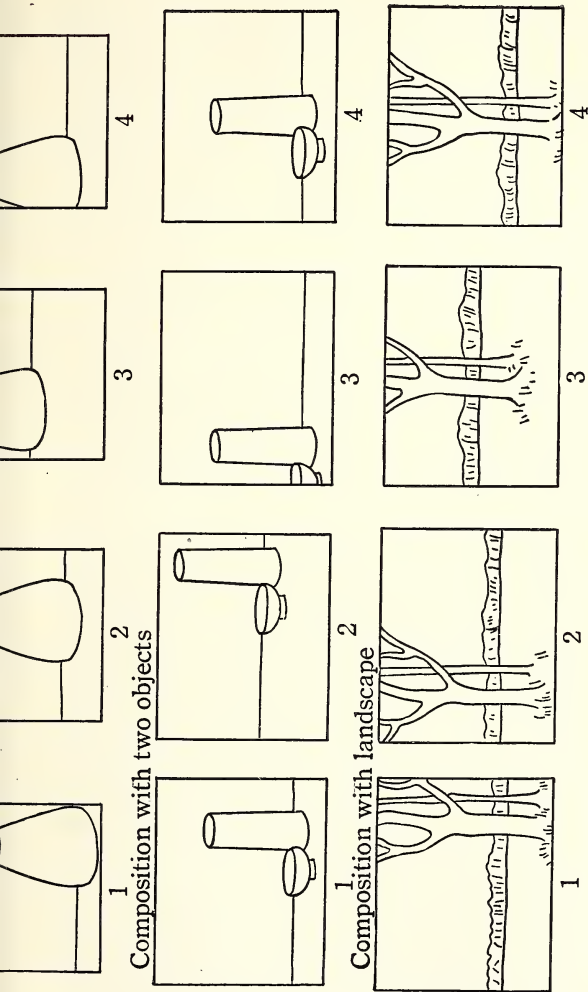
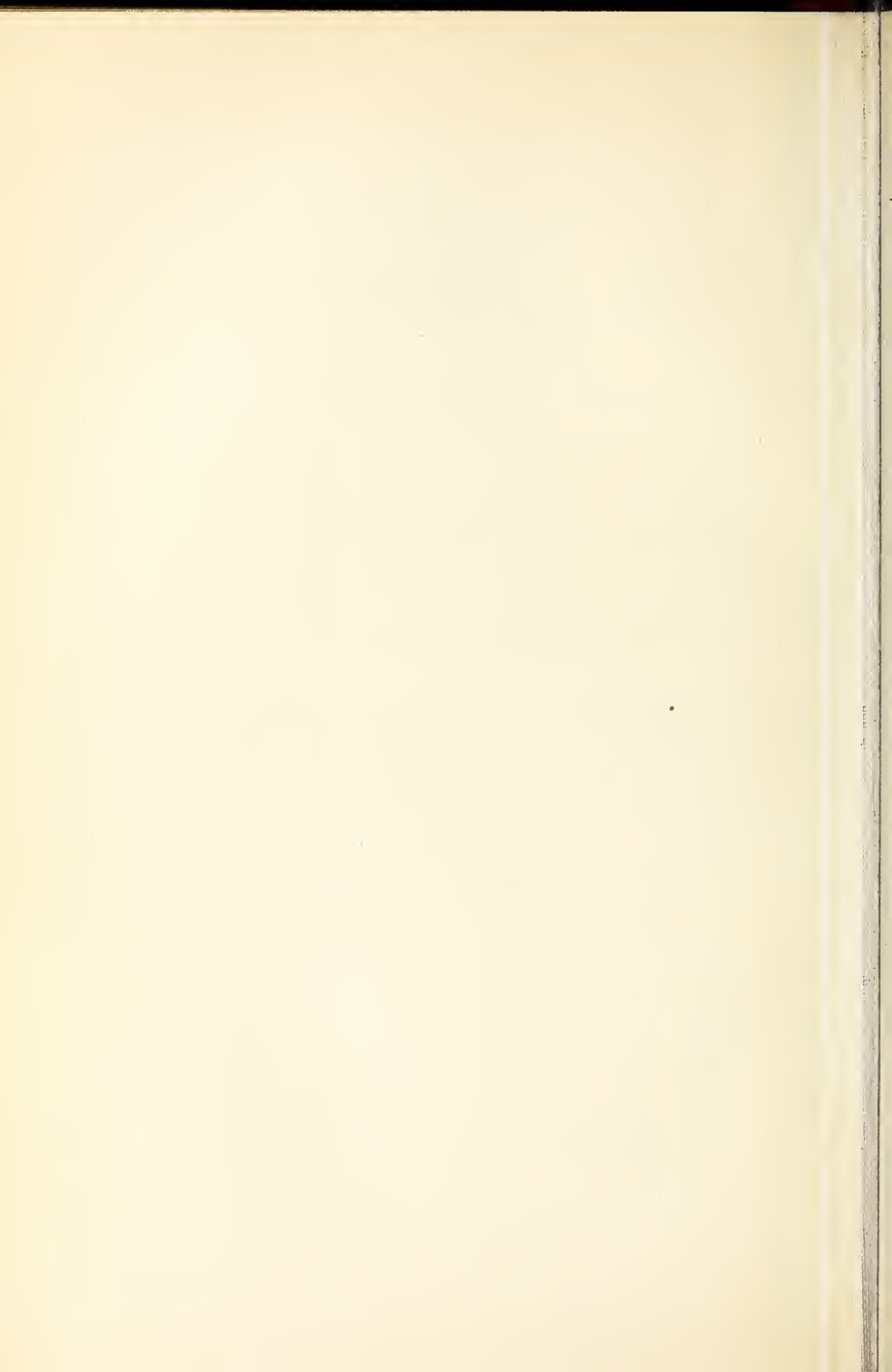


FIG. 47. TEST FOR RECOGNITION OF PROPORTION



Observation of light and shade. In this test drawings are given that are partially shaded. The child is required to mark each place where he thinks there should be a shade or a shadow.

Analysis of problems in cylindrical perspective. Pictures of a number of round objects are given with directions as to what the child is required to do.

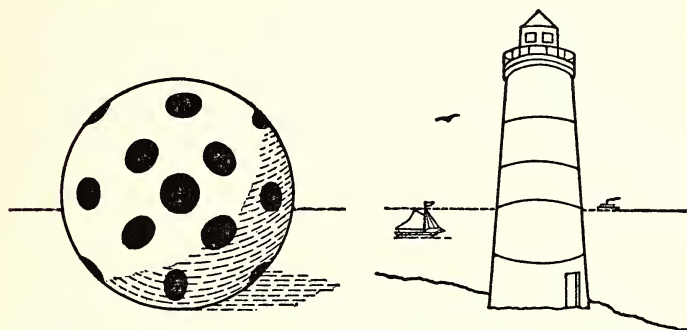


FIG. 48. TESTS FOR ANALYSIS OF PROBLEMS IN CYLINDRICAL PERSPECTIVE

Mark with an (X) each of the three round spots on the child's ball that are incorrectly drawn.

Mark with an (X) each of the two lines around the light house that are incorrectly drawn.

Analysis of problems in parallel perspective. In a similar manner, the child is tested on the principles of perspective with one vanishing point.

Analysis of problems in angular perspective. Pictures involving two vanishing points are given to test the principles of angular perspective.

Innateness. That artistic capacity is innate is inferred from the early and intense interests and the early achievements in art shown by artists. In the biographies of our celebrated artists the accounts constantly report definite manifestations of ability in drawing or painting before instruction in art was provided. However, artists rarely show

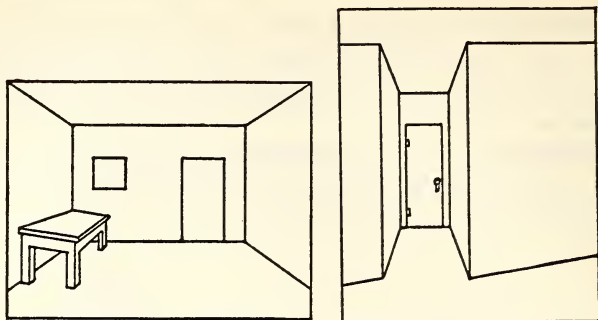


FIG. 49. TESTS IN ANALYSIS OF PROBLEMS IN PARALLEL PERSPECTIVE

Mark with an (X) any two untrue or incorrect lines in this drawing.

Mark with an (X) each of the two untrue or incorrect lines in this hall with connecting passage.

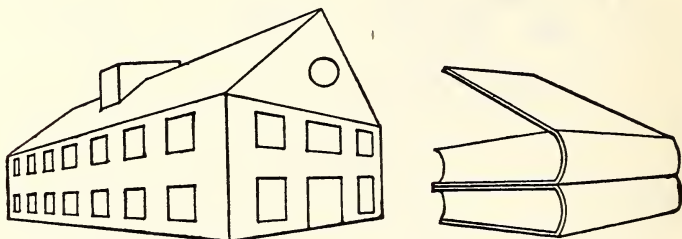


FIG. 50. TESTS IN ANALYSIS OF PROBLEMS IN ANGULAR PERSPECTIVE

Mark with an (X) the edge of the book that is incorrectly drawn.

Mark with an (X) five incorrectly drawn parts of this building.

their unusual drawing ability before the age of twelve or thirteen, an age at which a large percentage of musicians have already won fame. The following gleanings¹ show how early and strong the artistic tendencies were present in famous artists:

When Rembrandt, the celebrated Dutch painter, was fourteen or fifteen, "by what means we know not, the art craving was fully aroused, and his parents' ambitious scheme for his serving the City

¹ Cox, C. M. *Genetic Studies of Genius*, vol. 2. Reproduced by courtesy of Stanford University Press.

and Republic was as nothing beside his own irresistible desire to express himself in form and color."

For the Italian painter, Raphael, the all-absorbing interest from his earliest childhood was art. According to tradition, Raphael's earliest paintings date from his eleventh year, but there is no definite evidence regarding work before his twentieth or twenty-first year.

William Hogarth, English painter and engraver, early discovered that "he had a good eye and a fondness for drawing," and devoted every possible moment in making drawings or sketches. It was said that his essays were remarkable, not for their content, but for the ornaments which adorned them.

Murillo, the Spanish painter, probably began to draw and paint at a very early age, as tradition relates that his first authentic picture was painted when the artist was only fifteen.

The Flemish painter, Van Dyck, probably displayed his disposition toward painting early for at the age of ten he was "placed where he could pursue artistic studies." At the age of fourteen Van Dyck had painted a portrait of an old man. The picture is still extant.

Dürer, the German painter, produced a drawing of himself at thirteen, and several other sketches that showed remarkable ability for a child of his age.

Biographies of Joshua Reynolds, the English portrait painter, report that the early drawings of the young artist were not promising. However, an art critic who had seen the child's work at sixteen, said "he would rather take him as an apprentice for nothing than another for fifty pounds."

The Flemish painter, Rubens, from earliest childhood "took pleasure in copying" pictures, and at thirteen was apprenticed in art.

Da Vinci, the Italian painter, was received into the studio of a recognized artist by the time he was fourteen.

Of Michelangelo, the Italian painter, the following is given:

"At school Michelangelo devoted most of his time to drawing, a pursuit not included in the curriculum and which his father tried to discourage, as he did not wish a painter in the family. Michelangelo early sought the acquaintance of artists, and took every opportunity to converse with them. From his fourteenth to his sixteenth year, during the period of Lorenzo de Medici's patronage, the youth devoted most of his time to the study and practice of drawing, painting, and sculpture; he also cultivated the society of distinguished contemporaries as they met at Lorenzo's table, and

through them he was introduced to the great men of the past in literature....

"At the age of thirteen Michelangelo was so proficient in drawing that he received a salary, although he was then in the first year of his apprenticeship. His passion for his art was so strong that every available space became a sketch surface. It is written that he drew so well at this time that he 'caused wonder to all that saw it,' and envy to the less generous."

Correlation between drawing ability and general intelligence. It is of interest to note that the estimated I.Q.'s of our celebrated artists range from 110 to 160. The higher ratings are ascribed to those who, like Michelangelo, had other interests.

One of the earliest studies of drawing in relation to general intelligence ¹ found that ability to draw is correlated with some school subjects to a greater degree than with other subjects, but in no case did the correlation seem to be strong. This study, as well as others made soon thereafter, was made without objective tests. Grades received in drawing and in other subjects were used as the criteria of drawing ability and of general intelligence, and would be subject to the dangers of subjective ratings. However, the conscientious work of the investigators gives value to the general conclusions derived from the studies.

One of the best-planned studies of representative and analytic drawing, in relation to ability in verbal description and achievement in school subjects on the whole, showed the following correlations: ²

Representative drawing and description.....	.023
Diagraming and representative drawing.....	— .052
Diagraming and description.....	.231
Representative drawing and retention.....	— .022
Description and retention.....	.234
Analytical drawing and retention.....	.433

¹ Fischlovitz, A. *An Inductive Study of the Abilities Involved in Drawing*. Columbia University, 1903.

² Ayer, *op. cit.*

This means that from a knowledge of a child's ability in verbal description no inference can be made concerning his ability in representative drawing. Ability in diagramming (a kind of analytical drawing) can likewise not be considered indicative of ability in representative drawing. There is, however, a slight tendency of relationship between diagramming and description, and also between description and retention. Between drawing and retention there was a decided tendency of correlation.

A later study,¹ in which rankings attained on standardized intelligence tests were used as criteria for general intelligence, found that superior ability in drawing may accompany any degree of general intelligence from very superior to very inferior. To be a great artist, however, the study pointed out, a great number of supplementary factors must be brought to the support of the ability to represent simple objects graphically. The ability to acquire the advanced technique into which conceptual factors enter, and the ability to create original drawings of merit, alike are dependent upon general intelligence.

3. *Poetically gifted children*

Examples of early poetical ability. Poetic ability, like musical and artistic ability, is quite apt to display itself at an early age. Biographies of famous poets give repeated accounts of youthful achievements.

Southey began to write verses at nine years. The formidable titles, *Epics of the Trojan Brutus*, *Egbert*, *King Richard III*, etc., lead us to think that these early attempts were more than puerile rhymings.

When about eight years of age, Tennyson began to write poetry. He wrote an epic about six thousand lines in length

¹ Manuel, H. T. *A Study of Talent in Drawing*. Public School Publishing Company, Bloomington, Illinois, 1919.

when only twelve years of age. At fourteen, Tennyson wrote a drama in blank verse. His first published book of poems comprised forty-two poems written between the ages of fifteen and seventeen.

When Tasso was nine years of age, his mother went to a convent and young Tasso was sent to his father. Upon leaving his mother he composed the following poem (translated):

Relentless Fortune in my early years
Removes me from a mother's tender breast:
With sighs I call to mind the farewell tears
That bath'd her kisses when my lips she press'd!
I hear her pray'rs with ardour breath'd to Heaven,
Aside now wafted by the devious wind;
No more to her unhappy son 'tis given
Th' endearments of maternal love to find!
Far from her sight reluctant I retire,
Like young Camilla or Ascanius, led
To trace the footsteps of my wandering sire!

The following lines were written by Lord Byron at fifteen years of age:

My epitaph shall be my name alone;
If that with honour fail to crown my clay,
Oh, may no other fame my deeds repay;
That, only that, shall single out the spot,
By that remember'd or with that forgot.

Cowper's poetical gift began to show itself when the poet was about fourteen years of age. At this time he translated an elegy and also wrote an ode. The following stanzas are the first two of this early ode:

To rescue from the tyrant's sword
Th' oppress'd — unseen and unimplor'd,
To cheer the face of woe;
From lawless insult to defend
An orphan's right — a fallen friend,
And a forgiven foe;

These, these, distinguish from the crowd,
 And these alone, the great and good,
 The guardians of mankind;
 Whose bosoms with these virtues heave,
 O, with what matchless speed, they leave
 The multitude behind!

When Ralph Waldo Emerson was but ten years of age he wrote: "*The History of Fortus; a Chivalric Poem*, in one volume, complete; with notes, Critical and Explanatory, by R. W. Emerson, L.L.D." The closing lines are as follows:

... Six score and twenty thousand 'gan the fray,
 Six score alone survived that dreadful day.
 Ah! hear the groans of those that bled
 In that sad plain o'erlaid with dead.
 Fortus, who would not quit the field,
 Till every foe was forced to yield,
 To tender pity, now transformed his wrath,
 And from the bloody field pursued his path.

Goethe, before he was nine years of age, began to write little verses in German, Greek, and Latin which he called *Morgenglückwünsche*.

Heine's mother did everything possible to keep her son from superstition and poetry, yet before he was sixteen he had written a number of verses, some of which were considered clever.

Victor Hugo, between the ages thirteen and sixteen, composed verses of all varieties — odes, satires, poems, tragedies, elegies, epistles, imitations of Ossian, translations of Latin classics, romances, fables, stories, riddles, charades, epigrams, and a comic opera.

Longfellow's first printed verses appeared in the *Portland Gazette* when the poet was thirteen years of age. At fifteen, his poem "To Ianthé" was published. The following is the opening stanza:

When upon the western cloud
 Hang day's fading roses,
 When the linnet sings aloud
 And the twilight closes, —
 As I mark the moss-grown spring
 By the twisted holly,
 Pensive thoughts of thee shall bring
 Love's own melancholy.

Macaulay, at seven years and eleven months, wrote "Olans the Great." The opening stanza is given:

Day set on Cambria's hills supreme,
 And, Menai, on thy silver stream.
 The star of day had reached the West.
 Now in the main it sunk to rest,
 Shone great Eleindyn's castle tall:
 Shone every battery, every hall:
 Shone all air Mona's verdant plain;
 But chiefly shone the foaming main.

Walter Scott's earliest poem, a translation from the Latin, was written at eleven years of age. Edmund Spenser's poetic translations, written probably at the age of sixteen, have considerable merit. Voltaire said that he wrote verses from his cradle. His first published poem appeared when Voltaire was twelve.

Compare the youthful poetic achievements of celebrated poets with that of Betty Ford,¹ a modern gifted child who wrote the following verse at seven and a half years of age:

Oh, Master of fire, Oh, Lord of Air,
 Oh, God of waters, hear my prayer.
 Oh, Lord of ground and of stirring trees
 O God of man and of pleasant breeze
 Dear Father. Let me happy be
 As happy as a growing tree.

¹ See Terman, L. M., and Fenton, J. C. "Preliminary Report on a Gifted Juvenile Author"; in *Journal of Applied Psychology*, vol. 5, p. 163.

Objective test for poetic talent. Stumberg,¹ in a study of poetic talent, devised a series of tests which she gave to two groups of subjects, the one possessing and the other decidedly lacking poetic talent. Her object was to throw light upon the nature of poetic talent, and also to find some tests that might be found to be sufficiently distinguishing for use in the teaching of literature. A summary of the ten tests used follows:²

1. *Rhymes.* The task of finding rhymes was taken from Tolman's study of students with literary and scientific interests, in which he found that the students of literature did better than the students of science.

The following directions were given to the subjects: "I am going to read a list of words to you. After each word is read you will be given one minute in which to think of as many words as you can which rhyme with the word I have given." The subject wrote the words as he thought of them. The words used were: precede, ample, delay, pencil, delight, weather, destroy, mixture, affair, wagon, assess, nourish, arrange, butter, defend, churlish, review, hardy, commit and kettle.

2. *Controlled Association.* In Part A the subject was told: "I shall read a list of nouns to you. After each noun is given you are to write as many adjectives as you can which might apply to that noun. You will be given one minute for each noun. For example, if I say 'sky' you might give such words as gray, stormy, lovely, foreboding, etc. Write all the adjectives you can think of till I say 'Stop.'" The nouns given were: butterfly, dream, blossom, eagle and mountain.

¹ (White), Dorritt Stumberg. "A Study of Poetic Talent"; in *Journal of Experimental Psychology*, vol. 11, no. 3, pp. 219-34. June, 1928. Some of the tests used here are not included in the cited reference, but were used by Dr. White in making her study and were kindly supplied by her in personal correspondence.

² The summary of some of the tests are Dorritt Stumberg White's.

In Part *B* the subject was given five adjectives (smooth, blue, swift, dark, and deep). For each he was to list as many nouns as he could which that adjective might modify. He was then given five nouns (ocean, noon, priest, music, and spider) for which he was to list verbs.

3. *Imagery*. Although the limitations of a questionnaire on imagery were recognized, still, since the amount and vividness of imagery are an alleged part of the enjoyment and production of poetry, it seemed worth while to give a test of this type. After an explanation of the term 'imagery,' the experimenter said: "Now, I am going to give you some things to imagine and I want you to try to see or hear or smell or feel whatever I tell you to. In each case tell me how vivid your imagery is, using the number 3 to indicate that it is almost as clear as the actual sense-experience would be; 2 that you have a fairly clear image; 1 that you have a barely perceptible image; and 0 that you cannot get the image called for. As it is sometimes difficult to be sure of one's imagery, I will check from time to time by asking questions." An indication of the questions asked as checks is given in parentheses in the list of stimuli used. These questions were asked to make the subject more self-critical; in every case the subject's own estimate of his imagery was recorded.

- A. Visual. 1. A bird. Can you see a bird? (Where is it? What color is it?)
 - 2. A moonlight scene.
 - 3. The face of a good friend. (Smiling?)
- B. Auditory. 1. The whistle of a train. Can you hear it? (Is it high or low in pitch?)
 - 2. The splash of water on rocks. (Was it a loud splash?)
 - 3. The howling of a dog.
- C. Olfactory. 1. The odor of lilacs. Can you smell lilacs now?
 - 2. Hot coffee.
 - 3. Burning leaves.

D. Cutaneous. 1. Ice on your forehead. Can you feel the coolness?

2. Something warm in your mouth. (What is it?)

3. A rose petal brushed across your cheek.

E. Organic and kinæsthetic. 1. Can you get the feeling of suddenly coming down in an elevator?

2. Of running very fast?

3. Of flying? Not in an aeroplane, but you, yourself, flying.

4. *Rhythm.* Seashore's test of rhythm (one of his series of tests of musical talent) was given.

5. *Affective Reaction.* This test was suggested by the work done by Washburn, Hatt, and Holt on affective sensitiveness in poets and scientists. They used fifty nonsense syllables and fifty color combinations for each of which the subject expressed his judgment of pleasantness or unpleasantness by using any of the numbers from 1 to 7, 1 meaning extreme unpleasantness, 7 extreme pleasantness, and 4 indifference. In the present experiment three kinds of material were used; a list of thirty words (such as arrogant, bubbles, supercilious, slimy, etc.); fifteen things to be perceived (such as a black metal box, a selection from *Carmen* on the victrola, colored papers, scarves, etc.), and fifteen experiences to be imagined (a violent storm, rotten eggs, the feel of the hand on soft hair, etc.).

6. *Completion, A.* Directions were: "In each of the following quotations from poetry there is a blank into which one or more words should be fitted. Below each quotation is a list of words or phrases. Choose the one which you think is best fitted for the quotation — that is, the one which you think the poet himself used."

1. And overhead the aspen heaves
Its ——— silver leaves.

quivering; rainy-sounding; murmuring; dream-inspiring; lace and gold and; lightly trembling; branches covered with.

2. Soft as a bubble sung
 Out of a linnet's lung,
 Soft and most ——
 "Eva!" he said.

beguiling; enticingly; coaxingly; silverly; merrily; gently flung;
 silver-tongued.

3. Nor shall he know when loud March blows
 Thro' slanting snows her fanfare shrill,
 Blowing to flame the golden cup
 Of many —— daffodil.

an upset; an airy; a dainty; an ethereal; a sprightly; a dancing; a
 crushed.

4. And like —— water stood
 The bluebells in the azured wood.

a calm; a turquoise; an indigo; a pool of; a scented; a troubled; a
 skylit.

5. There when the turf in springtime flowers,
 With downward eye and gazes sad,
 Stands amid the —— showers
 A jonquil, not a Grecian lad.¹

overwhelming; downpouring; thundering; welcome; April; glanc-
 ing; gentle.

Completion, B. The directions were: "In each of the following quotations from poetry there is a blank into which one or more words should be fitted. Write the best word or phrase you can think of to put into this blank."

- a. Lovely and illusory,
 Dreams do well enough for me:
 What to you, then, if I choose
 To walk the world in shoes?
- b. The tones like into the stillness curl,
 The slippered hours their placid business ply.

¹ The words or phrases used by the poets were as follows: (a) rainy-sounding; (b) silverly; (c) an upset; (d) a skylit; (e) glancing.

- c. The mail has come from home,
From home that still remembers, to Japan,
My tiny maid, as faultless as
Bows in the doorway.
- d. Then hard behind, a stately galleon
Sails onward with its piled and towers,
Stiff sculptured like a heap of marble flowers.
- e. Bring, in this timeless grave to throw,
No cypress on the snow.¹

7. *Rorschach Test.* This is a form of the ink-blot test in which the designs are quite complicated. The first five and the last of the Rorschach cards were used. The subject was asked to look at each card and to tell what he saw. A complete record was kept of the subject's comments.

8. *Similes.* In part A, the subject was instructed: "The following lines are taken from poetry. Each quotation is an incomplete simile. You are to suggest as many ways as you can to complete it. You will be given two minutes for each. Do not attempt to get good poetic form — rhyme, rhythm, etc. Simply list ideas which might be worked into the poem as similes. For example:

The yellow moonlight dead
Lies silent as ——
the grave, a word unsaid, etc.

The quotations which were given were:

- a. The other was a softer voice, as soft as ——
- b. With the stars aswirl behind them
Like ——
- c. When I play on my fiddle in Dooney
Folks dance like ——
- d. I like a road that leads away to prospects white and fair,
A road that is an ordered road, like ——

¹ The words and phrases used by the authors themselves were: (a) winged; (b) smoke; (c) her fan; (d) carven; (e) sombre.

In part *B* the subject was given two minutes to find a symbol or metaphor for each of the following: respectively; life; failure; treachery; marriage for money; courage.

Tests 9 and 10 were tests for poetic memory and *Abbott and Trabue Exercises in Judging Poetry*.

Findings as to poetical ability. The findings of the study lead the investigator to conclude that there are several characteristics indicative of poetic talent.

The poets show an ability to rhyme with more facility than the controls, and they exhibit a larger vocabulary. This vocabulary might not be larger if a reading knowledge were being tested; but the poetic subjects are able to produce more words than others in a given situation. From the subjects' reports it appears that the poets experience a relatively large amount of imagery. Their "sense of rhythm" is not so good as one would expect it to be; but this may be due to the character of the test. The poets are able to see more things in the Rorschach ink-blots than the non-poets, which may be considered an indication of at least a certain type of imagination. Their memory for poetic material is better than that of their fellows. But the most striking and significant fact of all lies in the difference between the two groups with respect to figures of speech. This difference comes out with the use of similes and also in controlled association. The ability to see a likeness in two otherwise dissimilar things and likewise the tendency to use phrases involving such an apprehension are especially characteristic of the poetically talented group.

CASE STUDIES

1. *Musical Ability*

The case. Rigmor is a ten-year-old daughter of Norwegian immigrants. The father is an unskilled laborer and is now working in a coal mine; there are ten children in the family. This year a music supervisor has been employed for the first time in the schools of the mining camp in which Rigmor lives. Soon after the supervisor began work she recognized that Rigmor's voice is of grand-opera quality. All the members of Rigmor's family are music lovers and all have good voices. The supervisor realizes that Rigmor's voice

is of such superior quality that it must be conserved and cultivated for grand opera.

Query. How would you proceed with Rigmor's case if you were the music supervisor?

2. *Artistic Ability*

The case. The subject of the case study following the chapter on psychopathic children (Chapter XI) hopes some day to be an artist. While in school, his art work was much superior to that of his classmates. On his long trips he spends a great deal of time in sketching. He is always speaking of the time when he will be able to go to some art school. The boy's uncle says that Walter's pictures do show ability, and that he is willing to send his nephew to an art school now if the boy will go. Walter is evasive about his reasons for not wanting to go to art school at present.

Queries. Do you think that the boy will ever become an artist? Granting that he has exceptional artistic ability, are his other traits conducive to the making of an artist? Why does Walter refuse to go to an art school now, when his uncle is able and willing to send him?

3. *Poetic Ability*

The case. Helen is ten years of age, and has an I.Q. of 156. From the time that she learned nursery rhymes she began to make up little rhymes and jingles of her own. She enjoys listening to poetry, and has always preferred to have her mother read poetry to her, rather than to tell her stories. Helen's mother has encouraged her daughter's love for rhyme from the beginning of its appearance. Helen's teachers and her mother are confidently expecting Helen to become a poet. Helen is in an opportunity room for gifted children. So far her poetry is characterized by rhythm and rhyme, her teachers say, and often is rather melodramatic; she does not show depth of thought in her poetry. She writes rapidly and spends very little time in rewriting her work; her work is spontaneous.

Queries. Do you think that Helen will ever become a "poet"? How would you direct her interests and talents? Why?

SELECTED REFERENCES

1. Bronner, A. *The Psychology of Special Abilities and Disabilities*. Little, Brown and Company, 1917.
2. Hollingworth, L. S. *Special Talents and Defects*. The Macmillan Company, 1923.
3. Manuel, H. T. *A Study of Talent in Drawing*. Public School Publishing Company, Bloomington, Illinois, 1919.
4. Mitchell, F. B. "Mathematical Prodigies"; in *American Journal of Psychology*, 1907.
5. Révész, D. G. *The Psychology of a Musical Prodigy*. Harcourt, Brace and Company, 1924.
6. Scripture, E. W. "Arithmetical Prodigies"; in *American Journal of Psychology*, 1891.
7. Seashore, C. E. *The Psychology of Musical Talent*. Silver, Burdett and Company, New York, 1919.
8. Stumberg, Dorrit. "A Study of Poetic Talent"; in *Journal of Experimental Psychology*, vol. 11, no. 3. (June, 1928.)
9. Washburn, Hatt E., and Holt, E. B. "Affective Sensitiveness in Poets and in Scientific Students"; in *American Journal of Psychology*, vol. 34, pp. 105-06. (1923.)

CHAPTER X

THE PSYCHONEUROTIC CHILD ¹

The emotional life of the child. The physical disorders of children have long been appropriate objects of interests, study, and treatment. The importance of a child's intellectual status is now duly recognized, and elaborate provisions are made to help the intellectual deviate to adjust himself. The emotional life of the child, however, is practically ignored or grossly misunderstood by parents and teachers alike. Most teachers seem interested in only "disembodied intellects." Our whole educational system is designed to develop the child's intellect — but one phase of mental life; that a child's emotional life also is in need of training and often of adjustment is just beginning to be realized.

Definition; psychoneurosis. An abnormal mental process is designated as a psychosis, and an abnormal nervous functioning is designated as a neurosis. Formerly the two terms were used to distinguish the morbid conditions primarily psychic in origin from those of a purely physical origin. At present, the tendency is to include both terms in the term *psychoneuroses* because it seems practically impossible to distinguish between mental and physical origins. Psychoneurotics, then, are those individuals suffering from psychogenetically or neurogenetically morbid processes.

In popular parlance the psychoneurotic child is usually designated by less serious terms, such as nervous, peculiar, queer, bright but erratic, emotionally unstable, different, odd, etc. He is regarded as a deviate from normalcy, but the seriousness of his deviation rarely is recognized.

¹ The writer is indebted to Dr. Forrest N. Anderson, director of the Los Angeles Child Guidance Clinic, for the technical contents of this chapter.

Psychoneurosis can be developed in various different forms; hence description of the state is difficult. In general, however, a psychoneurotic child, for reasons other than intelligence, does not get along in groups of children of his own intellectual development. The child who is always out of step in his class, the one constantly in trouble with his fellow playmates or his teachers, the child who constantly usurps the teacher's attention in the schoolroom or always wants to be leader on the playgrounds, each is apt to be a psychoneurotic child. Likewise, it is probable that the child who is not troublesome, but who is persistently silent and inaccessible, is a psychoneurotic child. Children who are only "seen and not heard," and who only "speak when spoken to" do not have wholesome mental conditions. "Extreme docility," say Irwin and Marks, "however it may be idealized by the proverbs, is no more desirable from an educational point of view than... incorrigible naughtiness..."

It has been estimated that about 5 per cent of school children are neurotic; that is, they are of sufficient nervous instability to make them susceptible to emotional complexes capable of interfering with good adjustment.

Psychoneurotic characteristics: Psychic. Although very different manifestations may be symptomatic of psychoneurosis, there is a common tendency to react either too intensely or in a manner out of harmony with the experience.

As a group, psychoneurotic children are predominantly loquacious, supersensitive, self-conscious, excitable, eccentric, and pugnacious. Sometimes opposite trait extremes are present, such as listlessness, indifference to the opinions of others, timidity amounting to fear, suspicion, mutism, oppressive terrors, ready fatigability from any exertion, day-dreaming, dislike for set tasks, refusal to face facts — especially disagreeable ones, difficulty in reaching decisions,

and rare joining in with other children's occupations. Often the child experiences an inner sense of uncertainty and a lack of self-confidence that may be met in opposite ways than timidity, namely, by an aggressive, egotistic self-assertion. These extravagant measures for concealing his own inner state, and attempting to convince others that his condition is not what he knows it to be, are called "compensation" devices. Psychoneurotics have limited power of concentration and are often described as "flighty." "The neurotic child is constantly and unconsciously pleading for love and attention, very often using illegitimate means to obtain his ends. He is retarded in his emotional development as the feeble-minded child is retarded in his intellectual development." ¹

Physical characteristics. The physical characteristic symptoms complained of by psychoneurotics are usually grouped under a general category designated "nervous." These symptoms include a great variety of complaints for the nervous system of psychoneurotic individuals is actually disturbed. Among symptoms of the disturbed nervous system in children are facial and body twitchings, speech defects, lack of appetite, apathy, spasmodic movements, sleeplessness, night terrors, enuresis, poor motor control, poor carriage, headaches, crying, "jumpiness," chronic fatigue, worries, compulsive ideas, persistent obsessions, and ideas of losing the mind (among older children). An examination, however, discloses an organically sound nervous system. The nervous disorders of the psychoneurotic child are really emotional disturbances. That is, the individual may be physically and intellectually sound, but emotionally disturbed. To be suffering from a symptom usually means that there is a disease of a structural nature. In the case of emotional disorders, that is, disturbances in the natural

¹ Irwin and Marks, *op. cit.*, p. 182.

outflow of the emotional life, this does not obtain. The symptoms may be real, that is, genuine to the subject, without having organic or structural basis. These disturbances are grouped under the broad general term of "psychoneurosis." All of these physical disturbances of the nervous system can be present in non-psychoneurotic children. They are symptomatic of psychoneurotic children only when their psychic or mental origin is determined.

Psychoneurotics present a group of symptoms which deviate both ways from normal. They may be overalert, hypersensitive, and unduly stimulated by all in their environment, or they may show opposites of these traits — apathy, lack of sensitivity, and indifference to those of their environment. They may be very emotional, readily aroused to extreme pleasure or grief, overenergetic, tense, or they may be decidedly lacking in all these traits. In comparison with normal children of corresponding intelligence level they are verbalists; that is, they see little difference between speaking of doing things and of doing itself. They seldom culminate their verbal planning with action or deeds. They use language profusely, glibly, superficially. They have violent loves and hates, and live at one emotional extreme or the other. They may be overexhilarated, in a state of chronic depression, or they may alternate rapidly between these emotional extremes. In children these emotional extremes are often shown in regard to foods, movie stars, toys, playmates, and almost anything that normally does not call for an intense emotional reaction. The brighter psychoneurotic children are very apt to have fears.

As a rule these children do not get along well with children of their own mental age; they prefer the attention they get from adults. Often the psychoneurotic seeks playmates who are below him in actual intelligence, for by such associations his exaggerated ego is exalted. He does not play con-

tentedly with other children, nor are other children always safe with him. Often the psychoneurotic child over-emphasizes neatness, cleanliness, or some oddity of precision, or he may show the opposite traits of carelessness in these matters. While playing he has more accidents, and he exaggerates trifling accidents to himself, to his clothes, his toys, or to his pets.

Origin of symptom complex. A neurotic disposition is probably due to native characteristics, together with an unsympathetic environment. It is usually first manifested by non-adjustments in the home; upon coming to school, the child's habits of non-adjustments are continued and a symptom complex is gradually established. A symptom-complex is an inadequate attempt to solve a situational problem. The child is by no means always aware of his problem, but whether he is, or not, it must be emphasized that his symptom is not a deliberately acquired thing. It may, and usually does, gain for him some amelioration of a severely unpleasant condition or situation, but is not a straightforward meeting by recognition of issues and judgmental disposal of them. His symptoms may yield so much satisfaction in the way of attention, avoidance of responsibility, and so forth, as to preclude a sincere desire for their removal.

Psychoneurosis and intelligence. Intelligence or lack of intelligence is not a measure of psychoneurosis. A psychoneurotic child may possess the average amount of intelligence, or he may have more or less than the average amount. The only effect of the degree of intelligence of the individual is to increase the complexity of the psychoneurotic conditions. For instance, fear, anger, and joy are more apt to result in complex behavior in an intelligent psychoneurotic individual, while in an individual of low intelligence simple, uninhibited, or crude behavior is demonstrated. More

subtle and intricate ways of attracting unwarranted attention are utilized by the intelligent psychoneurotic child, while the dull psychoneurotic child's methods are simple and readily detectable.

Discovering the psychoneurotic child. The best single method of discovering the psychoneurotic child is observation of the child at play and work for an extended period of time by a clinically trained teacher. It must always supplement the psychiatric interview, when that is available.

Other devices are utilized by the school authorities in detecting psychoneurosis. A questionnaire,¹ based upon Woodworth's questionnaire for detecting psychopathic subjects, has been adapted as an aid in detecting psychoneurotic children. This questionnaire is composed of 100 questions classified roughly into four groups, namely, those dealing with:

1. Fears, worries, perseveration, etc. (21 questions.)
2. Physical symptoms, pains, weariness, incoördinations. (25 questions.)
3. Unhappiness, unsocial and anti-social moods. (37 questions.)
4. Dreams, phantasies, sleep disturbances. (16 questions.)

An additional set (about getting lost, No. 7) not belonging in any of these classes, is also included.

The test requires from 15 to 40 minutes. In gathering data for norms for the questionnaire, the investigator made the following conclusions from her findings:

1. Children may respond to the questionnaire with as few as 2 or as many as 70 unfavorable answers.
2. Boys, as a group, give fewer such answers than do girls.
3. Young boys tend to give more unfavorable answers than older ones, whereas the opposite tendency is shown by girls.
4. There are definite race differences, the Italians leading in size

¹ Mathews, Ellen. "A Study of Emotional Instability in Children by Means of a Questionnaire"; in *Journal of Delinquency*, January, 1923.

of score, while the Jews have as a group slightly larger scores than do the north Europeans.

5. Children selected because they show nervous or temperamental difficulties respond, as a whole, with more unfavorable answers than do those who are not so selected.
6. Within every group there is a great variety of scores, so that the different groups overlap considerably.
7. The self-correlation of the scores of a group of boys is $+.667$. These findings are not so convincing as we would like, but when we consider that human beings are prone to resist and deny their emotions, especially the more troublesome ones, the fact that our results point somewhat vaguely in the right direction encourages us to believe that such a questionnaire will be useful as a means of finding the children in a group who are laboring under special difficulties of this sort. The sexes respond so differently that it seems impossible to make a list that is suitable for both. The data at hand are better adapted for boys than for girls.

The psychoneurotic questionnaire. While the questionnaire has not proved successful for group use, it has formed a practical basis for individual interviews and is as suggestive as anything at present available for this purpose. Half of the 100 questions comprising the psychoneurotic questionnaire as published by the Public Educational Association of the City of New York, are reproduced here.

PSYCHONEUROTIC QUESTIONNAIRE FOR CHILDREN ¹

NAME _____ AGE _____ SEX _____ SCHOOL _____ GRADE _____

- | | | |
|--|-----|----|
| 1. Do you like to play by yourself better than to play with children?..... | Yes | No |
| 2. Do other children let you play with them?..... | Yes | No |
| 3. Did you ever run away from home?..... | Yes | No |
| 4. Did you ever want to run away from home?..... | Yes | No |
| 5. Do people find fault with you much?..... | Yes | No |
| 6. Do you think people like you as much as they do other people?..... | Yes | No |

¹ Published by the Public Educational Association of the City of New York.

298 PSYCHOLOGY OF EXCEPTIONAL CHILDREN

7. Did you ever get lost?.....	Yes	No
8. Do you ever feel that people are staring at you?.....	Yes	No
9. Does it make you uneasy to cross a bridge over water?...	Yes	No
10. Do you mind going into a tunnel or subway?.....	Yes	No
11. Are you afraid of water?.....	Yes	No
12. Are you afraid during a thunderstorm?.....	Yes	No
13. Do you feel like jumping off when you are on a high place?	Yes	No
14. Have you ever been homesick?.....	Yes	No
15. Are you afraid of the dark?.....	Yes	No
16. Are you often frightened in the middle of the night?....	Yes	No
17. Are you afraid of noises in the night?.....	Yes	No
18. Do you have a light in your room at night?.....	Yes	No
19. Do you ever cry out in your sleep?.....	Yes	No
20. Do you talk in your sleep?.....	Yes	No
21. Do you walk in your sleep?.....	Yes	No
22. Are you troubled with dreams about your play?.....	Yes	No
23. Do you dream about your family?.....	Yes	No
24. Do you ever dream of being chased?.....	Yes	No
25. Do you ever dream of people being dead?.....	Yes	No
26. Do you dream of robbers?.....	Yes	No
27. Do you ever have the same dream over and over?.....	Yes	No
28. Do you ever cry yourself to sleep?.....	Yes	No
29. Did you ever have the habit of biting your finger nails?...	Yes	No
30. Did you ever have the habit of picking your toes or your nose?.....	Yes	No

PSYCHONEUROTIC QUESTIONNAIRE FOR ADOLESCENTS. USED IN ADDITION TO QUESTIONNAIRE FOR CHILDREN

NAME _____ AGE _____ SEX _____ SCHOOL _____ GRADE _____

1. Do you ever have the feeling as if you were falling just before going to sleep?.....	Yes	No
2. Do things ever seem to get misty before your eyes?.....	Yes	No
3. Do you ever feel as if you were smothering?.....	Yes	No
4. Are you often bothered with pains in any part of your body?	Yes	No
5. Do you worry too much when you haven't finished your lessons or work?.....	Yes	No
6. Are you ever bothered by the same thought coming into your head over and over?.....	Yes	No
7. Are you usually on time?.....	Yes	No
8. Do you usually feel well and strong?.....	Yes	No
9. Do you usually sleep well?.....	Yes	No
10. Do you feel well rested in the morning?.....	Yes	No
11. Do you feel sort of tired a good deal of the time?.....	Yes	No
12. Do you feel bored a good deal of the time?.....	Yes	No

13. Do your eyes often pain you?	Yes	No
14. Do you ever have many bad headaches?	Yes	No
15. Have you ever fainted away?	Yes	No
16. Have you often fainted away?	Yes	No
17. Can you stand disgusting smells?	Yes	No
18. Does your family treat you right?	Yes	No
19. Do your teachers generally treat you right?	Yes	No
20. Are you ever bothered by a feeling that things are not real?	Yes	No

Attempts at discovering psychoneurosis through diagnosis of test findings. Binet was the first to show an interest in diagnosing intelligence-test findings in an attempt to differentiate the mentally disturbed from the mentally inferior. He was not able, however, to find any differentiating factors in the test findings. Later work in America suggested some practical factors that seemed to be an approach to determining a psychoneurotic personality by diagnosing test findings on the Stanford-Binet scale and on the Kent-Rosanoff Association Test. These factors, namely: (1) amount of test variability or "scatter," (2) quality of test variability, and (3) quality of individual test responses on the Binet scale and the (1) number and (2) quality of individual responses on the Kent-Rosanoff Association Test, will be described. Careful research has not found that these factors distinguish the psychoneurotic from the normal individual. At best we can say that these factors may be characteristic of a psychoneurotic, but they may also be encountered in the normal individual. It is an instance where experienced clinicians have been able to utilize factors in supporting diagnoses that cannot be used *per se* as objective evidence for psychoneurosis.

1. *Stanford-Binet test findings suggestive of psychoneurosis*

1. Amount of test variability as measured by number of years above basal year. The child who does no test above his basal year is very rare. The more unusual the development of a child has been the greater, it is thought, will be

his successes in certain lines. In general this is shown by range or "scatter" of successes above the basal year. In the case of some psychoneurotic children wide scattering has been found.¹ One investigator² claimed that although available data are not absolute, still for practical purposes sufficient corroborative data indicate that when there is a scattering of more than four years above the basal year it may be a definite indication of instability.

2. Quality of test variability. Some investigators³ found the quality of test variability to yield diagnostic data. Their findings seemed to indicate that in general psychoneurotics are relatively good in comprehension, rote memory, absurdities (?), and use of abstract terms, and that they are definitely poor in memorial content as shown in reading reports and in reproducing designs, and are relatively poor in sixty-word enumeration, solving enclosed boxes, the weights, and constructing sentences from three words.

3. Quality of individual test responses. The quality of individual test responses, failures as well as successes, has also been suggested to have diagnostic value. The psychoneurotic has been found to give additional irrelevant or faulty details to a correct response. Other unusual responses, such as nonsense syllables in sixty words in three minutes, unexpected delay or acceleration of response, application of all conversation to himself (definitions, sentences, fables, absurdities, etc.), and monosyllabic answers are considered abnormal responses and have been utilized in diagnosis, although no general conclusions in regard to their significance are available.

¹ Goddard, H. H. "The Problem of the Psychopathic Child"; in *American Journal of Insanity*, pp. 511-16. (April, 1921.)

² Doll, E. A. "'Scattering' in the Binet-Simon Tests"; in *Training School Bulletin*, pp. 96-103. (October, 1919.)

³ Wells, F. L., and Kelley, C. M. "Intelligence and Psychosis"; in *American Journal of Insanity*, pp. 17-45. (July, 1920.)

2. *Association-test findings suggestive of psychoneurosis*

1. Quantity of individual responses in word-association tests. Psychoneurosis has been inferred from the number of individual responses in word-association tests like the Kent-Rosanoff¹ 100 word series. Ten individual reactions for children ten years old or more are considered to be within the limits of normality. A greater number has been inferred to signify neurosis. For children under ten years much greater allowance must be made, although as yet indicative norms are not available.

2. Quality of individual responses in association tests. The quality of individual responses on the Kent-Rosanoff association test has been used as a means for determining the presence of complexes which often are implicated in psychoneurosis.

Performance tests. Performance tests have been developed, primarily, to test foreigners, the deaf, and the mute for whom verbal tests like the Stanford-Binet are ill-adapted. Theoretically, the well-balanced child will probably score approximately at the same level on performance and verbal tests. Most performance tests are largely dependent upon hand and eye coördination and general muscular control. This is largely a matter of physiological development, and only in part a matter of intellectual control. The bright child usually does not do as well on performance tests as upon the verbal tests, while the feeble-minded child will make a better rating on the performance tests than on the verbal tests. Psychoneurotic children, with nervous systems functionally unstable, rate much lower on a perform-

¹ See Wells, F. L. *Mental Tests in Clinical Practice*, chapter IX. World Book Company, 1927.

Mateer, Florence. *The Unstable Child*, p. 452. D. Appleton and Company, 1924.

Otis, Margaret. "A Study of Association in Defectives"; in *Journal of Educational Psychology*, vol. 6, pp. 271-88. (1915.)

ance scale than on a verbal scale. For diagnostic purposes when mental age on performance tests and on Binet tests differ as much as four years, investigation in regard to the emotional stability of the child may be desirable.

Educational tests. Normal intelligence is definitely related to normal school progress.¹ Of psychoneurotic children, about 20 per cent score below the grades they should cover. While educational-test findings are not sufficiently diagnostic unless the ratings are compared with other ratings, still the probabilities would seem to be about three to one that when mental age is fairly normal and school tests low, the child is psychoneurotic rather than normal.²

Child's own story. Healy has shown us that the child's story as he tells it, without interruption or criticism, offers the greatest possibilities for diagnosing the child. Whether in his recital the child assumes the attitude of a hero, of one persecuted, or of one frankly meeting situations, and willing to acknowledge blame and assume responsibility, is of great significance. Points brought out, irrelevance, ambiguity, logical coherence, forgetfulness, wrong sequence, plausibility, emotional expression, and the like, can all be used for diagnosis. A plain story, usually a plain statement of facts, is typical of the normal child, while the feeble-minded child tells less of a story, tells it less well, and requires more prodding. The psychoneurotic child, however, discloses bewildering motives, wrongs, sufferings, bravery, heroism, and thrills.

Behavior during examination. The normal child shows but few peculiarities during the procedure of an examina-

¹ Terman, L. M. *The Measurement of Intelligence*. Houghton Mifflin Company, Boston, 1916.

² Mateer, Florence. *The Unstable Child*, p. 190. D. Appleton and Company, 1924.

tion, and the feeble-minded child shows only peculiarities indicative of his stupidity. The psychoneurotic child, however, has a large repertory of peculiar and unpredictable behavior-reactions at his disposal. Among these are nervousness, peculiar postures, movements, gestures, queer facial expressions, unwarranted laughter, giggling, distractibility, wandering about the room, obstinacy, temper "tantrums," mutism, crying, banging, throwing, and so on.

It should be emphasized that one cannot use for psychoneurotic diagnosis an examination record in which the examiner has not watched and recorded most carefully the various traits indicative of psychoneurosis. Most mental examiners examine for intelligence level only. A general refinement of procedure with clinical experience is necessary in order to be able to diagnose properly the child's state of stability.

Conflicting opinions. It is interesting to note the conflicting opinions in regard to the inherent traits of the psychoneurotic child. The majority of the psycho-analytic school hold the opinion expressed by Burrow,¹ that "the neurotic patient is frequently far above the average intellectually." Cameron² characterized the neurotic individual as follows:

A sensitive nervous organization is often the mark of intellectual possibilities above the average and the children who are cast outside of the ordinary mould, who are the most wayward, most intractable, who react to trifling faults of management with the most striking symptoms of disturbance, are often those with the greatest potentialities for achievement and for good.... The mother of the nervous child may often rightly take comfort in the thought that

¹ Burrow, T. "Permutations Within the Sphere of Consciousness"; in *Journal of Abnormal Psychology*, vol. 11, pp. 179 f. (August-September, 1916.)

² Cameron, H. C. *The Nervous Child*, p. 10. London, Henry Frowde Company, 1923.

her child is worth the extra trouble and extra care which he demands, because he is sent into the world with a mechanism which, just because it is more powerful than the common run, is more difficult to master and takes longer to control and apply for useful ends.

Others take the opposite viewpoint and hold that these children are characteristically inferior in many of the essential, desired qualities. Hollingworth¹ has described neurotics as being characteristically inferior in such essential qualities as coöperation, adherence to definite directions, power of sustained effort, and fidelity to bare facts. Neurotic children, Hollingworth points out, often fail because of impulsive response, negativistic attitude, flightiness and illusion. This investigator holds that nervous instability may be found in combination with any degree of intelligence, apparently from dullest to brightest, but adds that although the relation between stability and intelligence is not known, still there is considerable indication that it will be found to be positive and high (but not perfect). That there are more ill-balanced children among the dull than among the bright is suggested by the probability that the organic quality which shows itself in superior intelligence and robustness may also show itself in nervous stability.

Research findings. In order to find absolute distinctions between the neurotic and the normal child, a research study was directed toward the problem.² Fifty children, diagnosed as neurotic by psychiatric authorities, were paired with fifty normal children. In selecting the controls for each pair of children studied, such factors as sex, nationality, chronological age, grade, and school were kept constant.

¹ Hollingworth, Leta S. *The Psychology of Subnormal Children*, p. 70. The Macmillan Company, 1921.

² Rosen, Esther. *A Comparison of the Intellectual and Educational Status of Neurotic and Normal Children in Public Schools*. Teachers College, Columbia University, Contributions to Education, no. 188, 1925.

Conclusions were drawn from the results of a series of tests, the Stanford-Binet, the Pintner-Paterson Short Performance Scale, the Pintner Educational Survey, Handwriting, and Cancellation Tests.

In the general conclusions it was pointed out that none of the tests proved diagnostic of the condition which psychiatrists call "neurotic." A significant fact was discovered, however. In matching or pairing the neurotic children with the non-neurotic, the children who were paired with the neurotic were retarded in age-grade status and were below par in intelligence. The neurotic group was retarded in age-grade status when compared with the total school population — there were 9.6 per cent more over-age pupils in the neurotic group than there were in the total school population, and there were no under-age pupils in the neurotic group although the total school population showed 2.8 per cent pupils under age for their grades.

In the general findings the following statements are made:

1. The distribution of intelligence reveals that the neurotics match with a sample that is below par. Comparison of the neurotic group with an unselected group reveals that a greater proportion of neurotics are found among the stupid.
2. The school work of the neurotics is rather poor in terms of age-grade status. Their school work is "not poor" only in comparison with that of their non-neurotic mates, who are likewise retarded in age-grade status.
3. The handwriting of neurotics, as compared with the standard expected of their grade location, is poor as to quality, up to par as to speed.
4. There are no particular tests on the Stanford-Binet in which neurotics consistently fail or succeed, as compared with their non-neurotic mates.
5. The I.Q.'s of neurotic individuals are as constant as those reported by many investigators for large groups of unselected children.
6. Neurotics show the same amount of scatter on the Stanford-Binet as do unselected children.

7. The neurotic group meet with about the same success on the Pintner-Paterson Performance Scale as do the non-neurotic group.
8. The cancellation tests do not reveal a difference in the two groups in carelessness and inaccuracy as measured thereby.

In all of these various findings, the differences within the neurotic groups are much greater than the differences between the neurotic and the non-neurotic groups.

Many of these findings are at variance with previous findings, which only goes to show that at present observational methods must be given preference to test findings in determining the psychoneurotic personality.

Sims's investigation. Another recent investigation conducted by Sims ¹ leads to similar conclusions. Sims compared the variability of I.Q.'s for three groups of normal children with a group of psychopathic (in all probability the term *psychopathic* is used in place of *psychoneurotic*) children, and found that the amount of change corresponded with the length of time interval between testings. Data showing variability of I.Q.'s were selected from reported studies, namely, those of Lincoln,² Terman-Cuneo,³ and Ford ⁴ (psychopathic group). Sims gathered data on retests of normal children after intervals of two weeks. The following table shows the variability of I.Q.'s for the four groups of children.

¹ Sims, V. M. "Variability of I.Q.'s for Psychopaths Compared with Normal Children"; in *Psychological Clinic*, pp. 26-31. (March, 1930.)

² Lincoln, E. C. "The Reliability of the Stanford-Binet Scale and the Constancy of the Intelligence Quotients"; in *Journal of Educational Psychology*, pp. 621-26. (December, 1927.)

³ Terman, L. M., and Cuneo, I. "Stanford-Binet Tests of 112 Kindergarten Children and 77 Retests"; in *Pedagogical Seminary*, vol. 25, pp. 414-28.

⁴ Ford, C. A. "Variability of I.Q.'s for Psychopaths Retested within Fifteen Days"; in *Psychological Clinic*, pp. 199-204. (November-December, 1929.)

TABLE XXV. VARIABILITY OF I.Q.'s OF PSYCHOPATHIC CHILDREN,
COMPARED WITH THE VARIABILITY OF I.Q.'s OF
NORMAL CHILDREN

	Lincoln	Terman-Cuneo	Ford (psychopaths)	Sims
Interval between tests	3½ to 4 hours	48 hours	5½ days (ave.)	2 weeks
Change in I.Q.:				
16 to 20 points . . .			1	
11 to 15 points . . .		1	2	5
6 to 10 points . . .	5	8	13	3
1 to 5 points	16	11	17	10
0 points	9	5	3	0
Total	30	25	36	18
Average change	2.6	4.2	5.2	5.8

Sims explains that when comparing variability of I.Q.'s of psychopaths with normal children, most of the work on the variability of the I.Q. of psychopaths was based upon retests after a relatively long period of time. He concludes that until further evidence is presented there seems no justification for, and actual harm may result from, formulating a theory that psychopathy is a condition of unbalanced and unstable performance. On the basis of his study he states:

These facts seem to indicate that when the interval between tests is short, a psychopathic condition has but slight influence so far as change of the I.Q. is concerned. There is no decided difference between psychopaths and normals as to the amount of variation or the direction of variation noticed in these comparisons... there is some evidence furnished by the data indicating that the higher the I.Q. on the first testing, the greater will be the change on the retesting.

Treatment. The following suggestion for the direction of remedial work with psychoneurotic children was made many years ago.¹ It takes into account many factors re-

¹ Stelzner, H. *Die Psychopathischen Konstitutionen*. S. Karger, Berlin, 1911. (Quoted by Groszman in *The Exceptional Child*.)

sponsible for the disintegrated personality, and is suggestive of the greatest elaboration:

Contemplating all the forms of development of psychopathic (psychoneurotic) constitution among school children, we shall readily discover among them a great many in which the entire complex of symptoms is at first merely suggested by some form of moral disturbance; for instance, stubbornness, difficulty of management, outspoken ego-centricity, lack of self-denial and self-discipline, non-resistance to bodily irritation, moodiness, etc. In dealing with these children, should not that kind of education be considered most effective which lays greater stress upon moral values than upon intellectual and material ones?

The fact that a good school record and examination certificate are very important for success in life, for the struggle for existence, induces many to attach too much significance to success in intellectual work and to relegate moral efficiency into the shadowy background. The natural egotism of the child is not sufficiently counterbalanced; the utilitarian principle is pushed to the front.

Common rules of school education are only too apt to disregard conditions of common advance, and to substitute a vainglorious individualistic ambition which tempts the child to use his fists and elbows, so to speak, against his fellow pupils to secure his own advancement without regard to others. *This selfish conduct is found in accentuated form among psychopaths* [psychoneurotics]. To be kind without receiving praise for it, to deny oneself something in the interest of somebody else without receiving a reward; to show courage in danger without boasting of it to everybody, and similar ethic attitudes and acts are measured too low in the general valuation of conduct and progress.... This may sound commonplace, and yet it is important to point to these things in speaking of abnormal children, for the reason that the struggle for existence, which becomes more bitter every day, is pushing the threshold of consciousness of ethical sentiments ever higher and higher.

A few years ago a plea for the neurotic child was voiced at the International Conference of Women Physicians.¹ Said the speaker:

There is one last agency for the salvation of the neurotic girl (and

¹ Taft, Jessie. "The Neurotic Child"; in *Proceedings of the International Conference of Women Physicians*, vol. 3, p. 161.

boy), still to be considered. It is the most important and the most unprepared for the task of any, except the home. The school reaches practically every child, and does its part in deepening or lessening the neurotic tendencies. At present we are safe in assuming that for the most part it deepens these tendencies. It drives the neurotic child into truancy, vagrancy, anarchy, invalidism, and every form of delinquency, or hardens its emotional reactions into permanent moods, and it does all of this without in the least being aware of it.... If our public schools really educated, if they understood that education involves a training of the instinctive and emotional life as well as of the intellect, if they saw that they could not even develop intellect as long as they ignore desire, we should have an agency for adjusting the neurotic girl and boy second only to the home in its power. There is proof for this statement. Enlightenment is coming into education in spots. There are visiting teachers who work on the problem children in a school and get wonderful results. There are experimental schools whose methods are based on an understanding of the new psychology as it applies to educational theory. These schools are able to deal with the able but neurotic child who cannot get along in the public school.... They are not set like adults, and a little understanding, a little insight and patience, a mere approach to educational methods gives immediate results that are almost like magic.

Special classes for neurotics.¹ A few schools have organized special classes for the neurotic child. In these classes the teacher is allowed the greatest freedom in the course of study, methods of teaching, and program, since the conditions of the individuals are considered. The physical care of the children is usually emphasized; rest chairs are often placed in the back of the room, and the children are allowed to retire to them at any time. The test of whether a child is prepared to return to the regular class is usually his own desire to go back. In returning to a normal group, unless a careful selection of a teacher is made, the child may again revert to his infantile and maladjusted habits. A strict or overcritical teacher, one who conscientiously stresses traits

¹ See Irwin and Marks, *op. cit.*, chap. ix.

that the neurotic child has not developed, helps the child toward failure.

Examination of the following schedule of a neurotic class of the New York city schools will show how academic work is not stressed as it is with normal children.

DAILY PROGRAM

A.M.

- 9.00- 9.30 Academic Work
- 9.30-10.00 Showers or Swimming Period
- 10.00-10.30 Games
- 10.30-11.00 Orchestra
- 11.00-11.30 Hand Work
- 11.30-12.30 Academic Work

P.M.

- 1.30- 2.30 Shop, Bench Work
- 2.30- 3.00 Academic Work

The large amount of non-academic work was selected in order to replace for the overfantastic personality of the neurotic child the simple and primitive experiences which make for healthy physical and mental integration. In this particular school the swimming pool seemed to be one of the best resources at hand to furnish the tonic of primitive experience. Even the most hopeless day-dreamer came back from the realm of fantasy while he kept his head above water in the cold bath of the swimming pool.

CASE STUDIES

1. *A psychoneurotic*

The case. The following item is taken from a Los Angeles newspaper:

GIRL CONFESSES ATTACK "FAKED"

The three thugs who brutally attacked 15-year-old Virginia Malloy, and hurled her, bound hand and foot, into a clump of bushes in

Exposition Park, were located by police yesterday hiding in Virginia's imaginative little mind. And to-day she's back home at — Street, reading more detective stories.

Real-life detectives of Los Angeles are somewhat peeved. They lost considerable sleep scouring a large city, when they heard the report of juvenile authorities that the girl had not been attacked, and that she had confessed her hoax to Capt. Ed Slaughter.

Virginia, apparently enjoying her brief hour of glory, recited gleefully how she had cut and bruised her own body, tied herself up, stuffed a handkerchief in her mouth, crawled into a clump of park shrubbery and there started a burst of realistic moans. A Japanese student discovered the girl.

Query. What type of exceptional child would you call Virginia? Why was she able deliberately to "cut and bruise" her own body, a pain that most normal people cannot force themselves to endure? What training and supervision would you suggest for Virginia, in school and at home?

2. *A repressed personality*

The case. This adjustment problem was reported by Mrs. F. E. C., the second-grade teacher of the subject reported. It is stated as in the words of the teacher who told it to the author:

Jean is a mentally precocious child who is rapidly becoming neurotic through being misunderstood and mismanaged at home. She is now seven years and nine months of age. When seven years and five months old, Jean passed Gate's Reading Achievement Tests showing a reading grade of 3.6 and a reading age of 9.3. She was then in B 2. Her other work is correspondingly superior, but, since she has never had an intelligence test, I do not have her I.Q. rating.

Jean's mother is a teacher. She is very nervous, and has had the burden of supporting the family because the husband has had only part-time work. Included in the family are the maternal grandmother and grandfather, so that Jean has four adults who make themselves responsible for the child's right conduct. The child is the only one in the family. When visiting in the home, one feels the tension from which Jean undoubtedly must be suffering.

There is no special want in the home, but there is an apparent strain in the family relationships. Were it not that Jean's father is of the slow sanguine type, the family would, perhaps, not continue to hold together. Jean's mother married against her parents'

wishes, and now the parents have come to live with the son-in-law they once despised. Besides that they are in a destitute condition, and so must accept charity from him, which he has been unable to give except by the aid of his wife. Altogether it is an atmosphere conducive to anything but a tranquil and peaceful frame of mind.

Jean's mother says she cannot understand her daughter. This is not so strange, for in the first place she is so busy with all kinds of social obligations, in addition to her teaching, that she spends very little time with her daughter. In the second place, she is so nervous from overwork and financial worry that she is hardly a fit subject for any one to live with, and least of all a child of Jean's temperament.

At home Jean is supposed to be lazy, stubborn, and untruthful. I have not found any of these accusations true as far as school is concerned, and I feel that it is a problem of the parent-child relationship rather than the fault of the child herself, and that the adjustment must be made by the parents.

In school Jean is a sweet, lovable child, extremely shy and lacking in self-confidence. She is extremely diffident about appearing before the group, and will sit back unless I make a special effort to bring her out. She does exceptional work in all her studies. Her reading-test ratings are representative of her scholastic ability; she plays the piano well, shows considerable talent in art, has real literary appreciation, and is quite socialized except when overcome by shyness.

Shortly after Christmas she started to hand in a duplicate spelling paper, with this second paper written for "Sally." When I tried to find out about "Sally" Jean showed a disinclination to talk about it so I dropped the subject, but each day I humored her and corrected the two papers. I became interested in finding out the reason for the imaginary classmate, so I questioned Jean's mother about it. She knew nothing about it, and the very next day Jean handed in only one spelling paper. The mother later informed me that she had told Jean to stop such nonsense, for she wouldn't have it!

About a week ago Jean went to the board and wrote the following names:

Jean
Sally
Joan
Marian

At recess I had an opportunity to ask her about the names, in the following conversation:

"Have you four names, Jean?"

"No."

"Oh, you have playmates by these names?"

"No."

"Well, who *are* Sally, Joan, and Marian, then?"

"Oh, no one! Just make-believe girls."

"What do your make-believe friends do?"

"Oh — they play with me."

"All of them at once?"

"No — oh, sometimes."

With this much information she edged away, and so I changed the subject of our conversation. She evidently has quite an intensive and extensive mental make-believe life which is compensatory for the several deficiencies in her home life, such as lack of sympathetic understanding at home, real playmates, and a happy, tranquil atmosphere in which to grow up and develop into a normal personality.

One "story" which Jean had told her mother resolved itself around a vase which she had made in school. When she finished the vase she cut out a paper heart, and on this heart wrote "To Robert," her special boy friend. The mother saw the vase with its inscription in my room, but said nothing about it. When she went home she asked Jean how she was getting along with the vase, and to whom she would give it. Jean did not answer, so the mother asked whether she were going to give it to her mother. Jean said, "Yes," for which she was given a lecture and scolding, and the next day I was told how "impossible" Jean was getting to be and how she would tell falsehoods, with a citation of the vase incident.

Jean's situation needs to be corrected, and that soon if Jean is to grow out of the neurotic tendencies she is already showing, and is to develop into the fine normal personality she is capable of being. As I see the situation it can be accomplished only through parental adjustment, rather than through focussing of attention upon the child. A suitable environment and suitable parent-child relationship will take care of the child.

Query. If you were Jean's teacher, what method of procedure would you use in trying to approach the mother to make her realize Jean's predicament?

SELECTED REFERENCES

1. Adler, Alfred. *The Neurotic Constitution*. Moffatt, Yard and Company, 1917.
2. Blumgart, L. "Observations on Maladjusted Children"; in *Mental Hygiene*, vol. 5, pp. 327-41.
3. Burt, Cyril. "The Unstable Child"; in *Child Study*, July, 1919.
4. Evans, Elida. *The Problem of the Nervous Child*. Dodd, Mead and Company, 1920.
5. Ide, Gladys G. "A Clinical Survey of a First Grade"; in *Psychological Clinic*, vol. 13, p. 274.
6. Jung, C. G. "Theory of Psychoanalysis"; in *Journal of Nervous and Mental Disease*, Monograph Series, no. 19.
7. Long, Constance E. *Collected Papers on the Psychology of Phantasy*. Moffat, Yard and Company, 1921.
8. Mateer, Florence. *The Unstable Child*. D. Appleton and Company, 1924.
9. Mathews, Ellen. "A Study of Emotional Instability in Children by Means of a Questionnaire"; in *Journal of Delinquency*, January, 1923.
10. Moll, Albert. *Sexual Life of the Child* (revised edition). The Macmillan Company, 1922.
11. Taft, Jessie. "The Neurotic Child"; in *Proceedings of International Conference of Women Physicians*, vol. 3, p. 161.
12. Wells, F. L., and Kelley, C. M. "Intelligence and Psychosis"; in *American Journal of Insanity*, vol. 77, no. 1, pp. 17-45. (July, 1920.)
13. Wells, F. L. *Mental Adjustments*. D. Appleton and Company, 1921.
14. White, Wm. A. *Mental Hygiene of Childhood*. Little, Brown and Company, 1919.

CHAPTER XI

THE PSYCHOPATHIC CHILD

THE psychopathic individual is one who is psychically abnormal in ways other than those of mental deficiency, epilepsy, psychoneuroses, and alcohol and drug addictions.¹ The psychopath has anomalies of character that make adjustment to environment difficult or ineffective. These peculiarities of behavior are normal or usual for the psychopathic individual and cannot be considered a psychoneurosis, but the individual cannot be considered normal. The psychopath does not seem to be able to make satisfactory adjustment to environment, largely because of abnormalities of judgment, temperament, or character traits. Often he becomes actively disordered.

Psychoneurotic vs. psychopathic children. In the preceding chapter the psychoneurotic child was studied. If reference is made to the source material of the chapter, the reader will find that some of the material deals also with psychopathic children. To distinguish by any clinical methods between the psychoneurotic and the psychopathic child is extremely difficult, if not impossible. Writers, especially in the educational field, employ the terms interchangeably or in individual ways. In studying the educational findings in regard to either type, the investigator may well refer to the literature of both. Reference to psychiatric textbooks will help the student to differentiate between the two.

Both the psychoneurotic and the psychopathic individuals have anomalies of behavior. For the psychoneurotic,

¹ Rosanoff, A. J. *Manual of Psychiatry*. John Wiley and Sons. Sixth edition, 1927.

these anomalies are morbid; for the psychopathic, they are usual or normal.

Age at onset. As a rule, psychopathy does not make its first appearance in a mature individual. It is a constitutional condition that is present, and it can be detected readily even in childhood. The importance of early recognition and treatment cannot be overemphasized, for the accentuation of psychopathic traits with increasing age renders remedial procedures less effective.

Many individuals may be considered latent psychopaths. That is, under ordinary conditions they may adjust themselves more or less satisfactorily, and may be considered normal even though they have some marked peculiarities. During some critical period, however, their weaker strain becomes manifest. Thus, politicians with the best intentions to stop political graft have themselves succumbed to temptation when the opportunity for personal benefits presented itself. The manifestation of psychopathic traits may then depend upon environmental conditions.

Frequently, although not necessarily, constitutional psychopathic states are complicated with mental deficiency, epilepsy, drug addiction, etc.

Classes of psychopathic states. For convenience, the United States Surgeon General of the Army classified the psychopathic states into the following seven general groups:¹ (1) inadequate personality, (2) paranoid personality, (3) emotional instability, (4) criminalism, (5) pathological lying, (6) sexual psychopathy, and (7) nomadism. Summary descriptions of these groups follow.

Inadequate personality. This group is characterized by shiftlessness and lack of perseverance, judgment, ambition, and initiative. The individual is often annoying, unstable, without character, unreliable, and flighty. The proverbial

¹ Rosanoff, *op. cit.*, p. 187 ff.

hobo, as well as the well-educated and socially prominent ne'er-do-well, show typical inadequate personality traits. Often they refuse to work when work is obtained for them, or give up their jobs or positions at the slightest provocation. Usually they make a failure of everything they attempt. Sometimes they are rather successful in any line of work they undertake, but are not content to continue in any one line for any length of time. Laziness is an outstanding trait of this group of individuals.

Paranoid personality. This group differs from that type of insanity called paranoia only in degree. As in paranoia, suspicion and conceit characterize the individuals, although they are not so confirmed as to cause typical paranoia delusions. In paranoia some fixed delusion becomes systematized. That is, the delusion is the matrix of a whole system of false beliefs arrived at by way of rationalization, in order to harmonize other facts and beliefs with the original delusion. In other ways the individual's mind may seem normal.

The following case will illustrate a paranoid personality in the case of a twelve-year-old girl. This girl, a very nervous, anæmic, and underweight child, lived in a convent. She told the writer that the nuns at the convent "persecuted" her, although they liked the rest of the girls. Among other things she told how the nuns put sheets over their heads at night and came into the dormitory to frighten her, and how every day they made her eat food (usually spinach) with poison in it. They did not make the other children eat this poisoned food. As a matter of fact the girl's restlessness at night and occasional sleep-walking made it necessary for one of the nuns to come to the child's bed to see that she was safe in bed and well covered. Her anæmic condition made a special diet necessary. Even though this was explained to the child, she persisted in misinterpreting the attention shown to her.

In paranoid personality there is a tendency toward persecutory trends, stubborn adherence to a fixed idea, argumentativeness, contempt for the opinions of others, and biased judgments. Overardent reformers of various kinds often come under this class. The vegetarians who refuse to eat meat because the taking of life is involved, and religious fanatics of various types, are often paranoid personalities.

Emotional instability. Psychopaths often alternate from deepest dejection and profound discouragement to boundless joy and feverish activity; from affection to hatred; from greatest selfishness and egoism to greatest generosity. Restless impatience often prompts them to action that can obviously have nought but unfortunate consequences. In the case of children, temper "tantrums" are often present.

Criminalism. In most psychopathics the moral sense is defective. This is quite generally true in those cases where mental deterioration is also present, although it is possible to have a defective moral sense independent of mental deterioration or low mental level. Lack of strong will, sane judgment, and perseverance underlie the faulty moral sense of psychopaths. Characteristic impulsiveness prompts them to commit crimes for which they subsequently show great remorse.

Evidence of criminalism often manifests itself in perversities of character and the conduct of the child. The child who delights in pulling wings off bees and flies, in tying tin cans to the tails of cats and dogs, etc., is more than just a "naughty child." Cruelty to younger children is another characteristic of this group of psychopaths. They are often deceitful, engage in petty thefts, and are irritable and violent. Often they are taciturn and dissembling.

In general, the exclusive aim of the child with criminalistic tendencies, as well as that of the adult criminal, is his own pleasure or interest, and he does not hesitate to use any

means to attain it. The adult psychopathic criminal has respect for neither honor nor truth. Toward his inferiors and toward the helpless he is cruel and malicious, and toward his superiors he is cowardly. He makes great effort to escape conviction and punishment, and does not hesitate to put the blame upon an innocent individual. He will stand by calmly while an innocent individual is convicted for a crime that he, the criminal, perpetrated. These characteristics, in lesser degree, are manifested in the psychopathic child with criminalistic tendencies.

Rosanoff points out that formal education does not modify the psychopathic criminal, for the ethical sense is not built upon notions acquired through intellectual culture.

Frequently other psychic anomalies are present in addition to criminalism. The four most common of these anomalies Rosanoff¹ enumerates, as follows:

1. *Weakness of judgment*: The subject realizes but imperfectly the possible consequences of his acts, and, in spite of all his precautions, he ultimately comes into conflict with the law. The thoughtlessness of criminals is well known.
2. *Absence of perseverance*: This trait prevents the utilization of any aptitude which the patient may possess, and which are in some instances very considerable.
3. *Impulsiveness*: Moral defectives readily yield to the first impulse, so that it is difficult in practice to distinguish them from the impulsive criminals. The best criterion is the subsequent *remorse* in the latter. Unfortunately, it is impossible to determine its true degree of sincerity. It is well known with what consummate art hardened criminals simulate the most touching remorse.

¹ Rosanoff, *op. cit.*, p. 190. Reprinted by permission from *Manual of Psychiatry*, by A. J. Rosanoff, published by John Wiley and Sons, Inc.

4. Other diverse psychic anomalies: Obsessions, morbid emotionalism, and the like.

Pathological lying. Pathologically lying has been described as falsification entirely disproportionate to any discernible end in view, engaged in by a person who, at the time of observation, cannot definitely be declared insane, feeble-minded, or epileptic. Such lying rarely, if ever, centers about a single event; although exhibited in very occasional cases for a short time, it manifests itself most frequently by far over a period of years, or even a lifetime. It represents a trait rather than an episode. Extensive, very complicated fabrications may be evolved.¹

Healy cites the following case as typical of pathological lying:

Janet B., nineteen years old, made her way alone to New York, and there readily obtained employment. After a couple of weeks she approached a department manager of the concern for which she worked and related a long story, which at once aroused his sympathy. She told him that her father and mother had died in the last year and that she was entirely dependent upon herself. When she was about four years of age she had been in a terrible accident and a certain man had saved her life. Naturally her father had always thought very highly of this person and had pensioned him. Formerly he lived up in the country with his family, but at present was old, penniless, and alone in the city. Now that her parents were dead she was in a quandary about keeping up her father's obligation to the old man. Out of her \$8 a week it was hard to make both ends meet. She had to pay her own board and for this man also. She found that he needed to be taken care of in every way; she had to wash his face and dress him, he was so helpless. She made no demand for any increase of salary and the story was told evidently without any specific intent. The services of a social worker were enlisted by the firm and the girl reiterated the same story to her, even though it was clearly intended that the case should be investigated. Janet's boarding-house was visited and there she was found to be living with distant relatives whom she had searched out upon her arrival in the city. They knew she had run away from home, and indeed by this time the mother herself was already in New York, having been sent for by them.

¹ Healy, W., and M. T. *Pathological Lying, Accusation, and Swindling*. Boston, 1917.

She then acknowledged that this story of a man who had saved her life was purely an invention. Now she stated that in the western town where she lived she had been engaged to a young man who was discovered to be a defaulter and who had recently died. When this fellow was in trouble, his mother, while calling on Janet's family, used to make signals to her and leave notes under the table cover, asking for funds with which to help him out. This was a great strain upon Janet and even more so was his death. She could stand it no longer and fled the city. Her lover's stealing was a secret which she kept from her own family.

Before we had become acquainted with the true facts about the family this girl gave us most extensive accounts of various phases of her home life which included the most unlikely and contradictory details. For instance, they had a large house with beautiful grounds, yet before she left home she bought a sewing machine for her mother, which she is paying for on weekly installments. Her \$8 a week is very little for her to live on because she is paying this indebtedness. Janet wishes now to take out a twenty-year endowment policy in favor of her mother. She expects to take up French and Spanish in the evenings because they would be very helpful to her commercially. She has no desire for social affairs. She is only desirous of improving her education. She related her success as a Sunday School teacher.

The most notable finding was Janet's facial expression when confronted by some of her incongruities of behavior. Then she assumed a most peculiar, open-eyed, wondering, dumb expression. When flatly told a certain part of her story was falsehood, she looked one straight in the eyes and said in a wonderfully demure and semi-sorrowful manner, "I am sorry you think so." Her expression was sincere enough to make even experienced observers half think they must themselves be wrong.

The story of this girl's falsifications and fabrications as obtained from her people is exceedingly long. Somewhere about twelve years of age, her parents cannot be certain just when, they noticed she began the exaggeration and lying which has continued more or less ever since.

Sexual psychopathy. In this group various types of maladjustment to sexual life are included, of which the most common is masturbation. Masturbation is very common among psychopaths, but because of its prevalence among

normal individuals it cannot be taken as a symptom of psychopathy. It has been found to be present in at least 90 per cent of males, and 65 per cent of females.¹ As a rule it is begun earlier in females — between the ages of five and eleven years in almost half the cases, while in the males it is begun between the ages of twelve and seventeen years in three fourths of the cases.² It is only when this practice is coupled with other psychopathic traits that it can be considered symptomatic of sexual psychopathy.

Exhibitionism is another rather common form of sexual maladjustment found among psychopathic individuals, and, like masturbation, is found among children. It often takes the form of an impulsive obsession.

Sexual frigidity designates a total indifference or even an aversion to normal sexual matters. The abnormal state opposite to frigidity is *eroticism*. It results in sexual excesses, and often in assaults. Both conditions may be of psychopathic origin.

Sadism consists in a sense of voluptuousness, accompanied by genital excitation upon witnessing or inflicting suffering in a victim. It is more frequently found among men. The state opposite to sadism consists in an abnormal sexual pleasure derived from suffering or humiliation. This condition is termed *masochism*, and is more frequent among women. Both conditions are of psychopathic origin.

Sexual inversion. The individual with this perversion presents sexual tendencies of the opposite sex. It is a congenital trait. Often these individuals have the character and tastes of the opposite sex. The little girl finds pleasure only in the more boisterous company of boys, and the little

¹ Dickson, R. L., and Pierson, H. H. "The Average Sex Life of American Women"; in *Journal of American Medical Association*, October 10, 1925.

² Davis, K. B. "Study of Certain Auto-Erotic Practices"; in *Mental Hygiene*, July, 1924, and January, 1925.

boy only in the company of girls and dolls. Often they show physical characteristics of the opposite sex.

Nomadism. The wandering impulse is present to some extent in most of us. It can be much stronger than average and still not be classed as an abnormal trait, as long as it does not break down social adjustment. The constitutional psychopathic nomads are those individuals in whom the nomadic impulse is so imperative as to lead to a tramp existence and constant aimless wandering, so that continued occupation is impossible. These individuals choose any convenient mode of travel — foot, automobile, freight cars, steamers — working only enough to supply themselves with food and clothes to cover themselves. Usually they do not hesitate to steal or to beg. The pathological nomad seldom stays long in one place — only a few hours — and is usually unable to give any other reason for his wanderings than that he wants to see the world. Strangely enough, he seldom troubles himself in seeing the sights of the places he visits.

Many of the above traits do not appear in the psychopathic child until proper opportunity arrives or until he grows older, hence they cannot give the direful warning of the individual's condition that an early appearance could.

CASE STUDY: A PSYCHOPATHIC BOY

The case. This case was reported by W. S., of Pasadena, California. This boy is now seventeen years of age. His uncle is able, and very anxious, to give the boy a good education.

History. Walter was born May 10, 1913. His mother gave birth to twin girls March 11, 1914, and Walter came to live in our home (uncle and grandmother) when about eighteen months old. During this time he was often not well and was under a doctor's care; he was treated for hydrocephalus. Walter's grandmother, who probably understood Walter better than any one else, died in 1916.

Walter's mother had a serious breakdown in 1916 and did not recover her health for seven years. During this time Walter's environment was a mixture of strange homes and schools, and of living with

people who did not understand him and whom he did not respect. His father is very impractical, a great reader and a great talker, but a poor provider.

Walter returned home before his mother was fully recovered and the home life was not ideal. His father never succeeded in gaining Walter's respect or obedience. The home life, because of the mother's condition, ran pretty much at loose ends; meals irregular, and no systematic training.

When Walter was seven or eight I took him back to the doctor who had treated him for hydrocephalus; he found no trace of the early trouble.

School life. All his school work was interrupted and unfavorable. He started school while away from home. At times he was unhappily situated. It is probable that he never entered sympathetically into his school work or activities. He gave every teacher trouble, mainly by failure to do his work and submit to the schedules. He would not recite, would not give attention, yet in some manner he absorbed about as much information as the average pupil.

When he was in the sixth grade he was given an examination by a specialist who recommended that he be taken out of school because of his health. The doctor said there was danger of a nervous breakdown.

The next year, by special arrangement, Walter was permitted to take some special art work in the high school, but he considered this work too elementary and left to go on a trip to South America. Notwithstanding the state laws, Walter has not been in school since, except for some short courses in art work.

Intelligence. In every mental test, and Walter has had several, he rated considerably above average. In general understanding, Walter would probably to-day rate with the average high-school boy, although in course content material he would be deficient. Walter is unusually observing and seems to couple a mature judgment with what he sees. He knows the "wherefore" of things.

Traits and interests. In dress Walter has always been careless, except when he dresses up. He can wear good clothes; they always seem to fit him and he is proud to be well dressed; yet he will go about in any old rags if it is more convenient.

In his habits he is unsystematic, almost temperamental. This may be the result of a lack of training. If he is interested in finishing a drawing, he will sit up most of the night, but he will lie abed half the next day if he wants to.

I have been unable to find him dishonest or more untruthful than the average child.

He began to smoke at an early age, I guess at about twelve years.

Although both of his parents are professed Christians, Walter has been allowed to grow up quite apart from any church training and only spasmodic home instruction.

In spite of his traveling propensities, he seems to have a real affection for his mother and home, and usually writes home when he is away. He does not run away — simply says that he is going and goes.

Neither Walter nor his older brother have entered into the usual activities of boys. He has not collected things; has not played ball or other games, except perhaps incidentally; did not dig caves and hunt Indians; was not a member of a gang.

He looked with derision upon the Boy Scouts, probably due to the influence of his older brother who always has been Bolshevik. He would not join the Y.M.C.A., although his uncle offered to pay his membership and urged him to join.

He seems to be a natural leader of boys, but prefers to travel alone. When away from home he always makes friends along the way, and has had many interesting experiences along this line.

Travels. At about ten or eleven, Walter began to take trips by himself. He would leave home without a nickel and go halfway across the continent — or to China.

When he was eleven, he left with a light blanket and a loaf of bread to spend the week-end at Camp Baldy. Up there he met a group of Boy Scouts who invited him to stay with them, but he declined. The cabin he expected to occupy he found locked and so spent the night out on a rough bench made of limbs, in a snow storm. He told me the night "seemed pretty long."

At twelve he started for China and got as far as San Francisco, where a telegram sent to his uncle ended the journey.

He has been through the Panama Canal three times; once on a trip to South America; once up the Atlantic coast as far as Boston in the winter time. On the South American trip he returned home from Alabama overland. He has been up the west coast numerous times. One overland trip took him to Kansas City; another to Salt Lake City. About a month ago he returned from a trip to China, and since then he has been up the coast again to Washington. While he seems anxious to get to places, he does not stay more than an hour or two. For years he wanted to see China, yet when he went he stayed only for two hours' shore leave.

Ambition. In many respects, Walter's life seems paradoxical. He acts like a recluse, yet makes friends. He is careless in his personal manners, yet he is proud. Although frail, he seems to have lots of grit. But above all, although careless and almost indolent in manner, he has one outstanding ambition which he seems to keep ever before him — he is to become an artist.

Walter has special ability in drawing, but not at all in proportion to his ambition. The schools allowed him to take some advanced courses in art in order to keep him in contact with school work, and in hopes of using his interest in art work as a means of arousing his interest for classroom work. It did not work out that way. Walter considered himself a young artist who should be drawing pictures on a big scale, rather than doing the simple, elemental things required of him in the high-school art classes.

Query. Make a careful diagnosis and prognosis of the above case. What can you suggest that would be helpful in handling the case?

SELECTED REFERENCES

1. Bleuler, Eugen. *Textbook of Psychiatry*. Translated by A. A. Brill. The Macmillan Company, 1924.
2. Bridges, J. W. *Psychology, Normal and Abnormal*. D. Appleton and Company, 1930.
3. Davenport, C. B. *Heredity of Constitutional Mental Disorders*. Eugenic Record Office, Bulletin no. 20, Cold Spring Harbor, New York, 1920.
4. Goddard, H. H. "The Problem of the Psychopathic Child"; in *American Journal of Insanity*, vol. 77, no. 4, pp. 511-16. (April, 1921.)
5. Healy, W., and Healy, Mary Tenney. *Pathological Lying, Accusation, and Swindling*. Criminal Science Monographs, no. 1. Little, Brown and Company, 1917.
6. McDougall, W. *Outline of Abnormal Psychology*. Charles Scribner's Sons, 1926.
7. Rosanoff, A. J. *Manual of Psychiatry*. John Wiley and Sons, 1929.
8. Sidis, Boris. *The Causation and Treatment of Psychopathic Diseases*. Richard G. Badger, Boston, 1916.
9. White, W. A. *Outlines of Psychiatry*. The Nervous and Mental Disease Publishing Company, New York, 1915.

CHAPTER XII

THE DEAF CHILD

Prevalence of defective hearing. The tremendous handicap of deafness is little realized, except by those afflicted. It does not make the pathetic appeal to our sympathies as does blindness, nor does it present the disciplinary problems of delinquency. It lacks the dangerous menace of contagious diseases, and the unpleasant aspects of physical deformities. Yet deafness, when once established, is, for the most part, incurable. The uneducated deaf lives in a world apart. Objects in his surroundings cannot have more than elementary meaning. Denied ready communication with people, through speech, reading, and writing, he is limited to his own barren mental life. As soon as this isolation barrier is broken down, as soon as the deaf child can communicate freely with his associates, his mental development can make its first great strides toward reaching its full capacity. It is not difficult to guess how slowly we would learn if we were allowed to speak to no one, and no one were allowed to speak to us, and if all books were kept from us. This is the situation in which the untrained deaf child finds himself.

Upon the basis of surveys of hearing in the public schools in our cities, and upon results of draft board examination during the World War, it was conservatively estimated that there are 10,000,000 persons in the United States with impaired hearing.¹ Moreover, 3,000,000 of these are school children who, with a tremendous handicap, must be trained to compete with normal individuals.

¹ Hill, F. T. "Otologic Research and its Benefit to the Deafened"; in *Volta Review*, p. 558. (October, 1929.)

Causes. The more common causes of deafness are:

1. *Heredity.* When deafness is present at birth it is generally an inherited condition, if relatives on either side of the child's ancestry were born deaf. There is only a very, very slight chance that a deaf child will be born to parents whose hearing is normal, and in whose families there have been no cases of individuals born deaf. The chances of deafness are increased when there have been born deaf on both sides of the family. These chances are further increased if the parents are related to each other, as first or second cousins. Inherited deafness is known as congenital deafness.

2. *Tainted family history.* The existence of a syphilitic, epileptic, or alcoholic family history on either the father's or the mother's side is often correlated with (some investigators say, cause) deafness.

3. *Carelessness.* Insufficient sanitary precautions, the use of instruments at birth, and the failure of the mother to take proper care of herself during pregnancy may result in deafness in the child. It should be added that while deafness due to any of these causes may be present at birth, they are not cases of congenital deafness and are not heritable.

4. *Illness.* Any sickness that is accompanied by continued high fever, especially if there is infection of the nose, throat, ear, or brain, threatens hearing. Scarlet fever, measles, whooping cough, typhoid fever, mumps, cerebrospinal meningitis, tonsillitis, quinsy, diphtheria, and influenza are among the most common illnesses causing deafness.

5. *Accidents.* A fall, a blow on the head, or inserting small objects into the ear may result in deafness. The old advice that children must put nothing but the elbow into the ear should be emphasized.

Treatment of deafness. A great deal has been learned

about the prevention of deafness, and comparatively little has been discovered concerning its cure when once it is established. Most specialists consider it incurable. Partial deafness is alleviated by various instrumental devices.

When deafness is established, the problem becomes one of training and education. Even though a later cure is promised, the training of the deaf child should continue as earnestly as if no recovery were possible, for the early training of the deaf child is most important.

Mental status of the deaf child. The first attempts¹ at rating deaf children showed that existing language tests were not adequate intelligence tests, for a test involving language becomes a subject-matter test for the deaf child. Later non-verbal or performance tests² were devised, and comparisons of deaf and of hearing children were made. In all cases the general intelligence of the deaf fell decidedly below the norms for the hearing. The conservative conclusion reached is that the deaf are from 2 to $2\frac{1}{2}$ years behind the hearing children. Even in a special ability, as visual memory for digits, the deaf fall greatly below the hearing, thus showing that there is no compensation in this respect for their lack of hearing.

The same investigators that conducted the previous studies also compared the mentality of the congenitally deaf with those who had acquired deafness. The average general intelligence was the same when the two classes of deaf children were compared as groups, nor were there any real differences in intelligence between the age groups when children who became deaf at different ages were compared.

¹ Pintner, R., and Paterson, D. G. "The Binet Scale and the Deaf Child"; in *Journal of Educational Psychology*, vol. 6, no. 4, pp. 201-10.

² Pintner, R., and Paterson, D. G. "Learning Tests with Deaf Children." *Psychological Monographs*, vol. 20, no. 4; whole no. 88.

Reamer, J. C. "Mental and Educational Measurements of the Deaf." *Psychological Monographs*, no. 132. Princeton, New Jersey.

The two common methods of teaching deaf children are the oral and the manual. In comparing the mentality between groups taught by these two methods it was found that the pupils taught orally were decidedly superior to the other group. This was explained as being due to the selective policy of the schools, whereby the brighter children are generally chosen for the oral method. Some schools followed the custom of beginning with the oral method, and later using the manual method in those cases that failed to succeed with the oral method. Thus the brighter children would be selected for the oral method.

Educational status. In general educational ability the deaf have been found¹ inferior to hearing children when tested by standard educational tests. On an average they are retarded by five years. Pintner and Paterson found that on the Trabue Language Scale very few deaf children score above fourth grade, and that on Directions Tests involving language comprehension the average deaf child rates as the average hearing child between six and eight. These studies also found that those who acquired deafness after five or six were decidedly superior in language ability, but did not find that children who possessed hearing for the first four years of life showed any advantage in language ability. One study² also showed that although the deaf taught by the oral method are superior to those manually taught, still, when intelligence is taken into consideration, both methods are equally efficient in teaching a comprehension of written English.

Cause for mental inferiority. We can readily understand why the deaf show inferiority in language ability and in school subjects. In considering the cause for the mental

¹ Reamer, J. C. "Mental and Educational Measurements of the Deaf"; in *Psychological Monographs*, no. 132. Princeton, New Jersey.

² Reamer, *op. cit.*

inferiority of the deaf we are at once interested as to why an inferiority should exist in activities that presumably do not involve audition. Data showed that general mental inferiority characterized both the congenitally deaf groups and those who had acquired deafness. Pintner¹ recognized this condition to be due to various causes, and considers each group separately. Sixty to seventy per cent of deafness, he points out, occurs after birth. The two main causes of acquired deafness are cerebral meningitis and scarlet fever, and since both these diseases in many cases affect the mentality of the normal hearing child, it is then reasonable to infer that mental retardation of the deaf is caused by the disease which caused the deafness. Instead of a disease causing deafness which in turn causes a mental retardation, the disease produces both a mental retardation and deafness.

In some cases of the congenitally deaf group, the development of hearing and of mentality may be due to pathological conditions. Other explanations have not yet been found, although it is possible that mentality development may be dependent upon hearing even though this does not seem to be the case. Congenital deafness is found more often in families of lower mental ability.

The deaf child's mental retardation of two or three years seems to pertain throughout his school life. The popular conception that the deaf child starts out handicapped, but later overtakes his hearing classmates, is not supported by test findings. There are exceptions, of course, but this is the condition in the majority of deaf children.

Training. Because of limited language ability the deaf child is not well suited for academic instruction, and cannot compete on a par with hearing children in many of the school subjects. In motor capacities basic to industrial success, the

¹ Pintner, R. *Intelligence Testing*, p. 323. Henry Holt and Company, 1923.

deaf child can compete with hearing children. Training and guidance should be directed toward industrial training; academic instruction should be directed only toward mastering the problems of the deaf child's trade.

The present tendency in education is to deinstitutionalize the deaf children. Housing great groups of deaf children under a single roof, surrounding them with conditions they will not encounter upon leaving the institution, with finger-spelling and sign language, is not as desirable as surrounding them with normal conditions. Many cities are organizing day schools in connection with their public school systems, and are meeting with splendid success. The children are taught exclusively by the speech method and in a speech environment, are allowed to play with normal children on the play grounds, they participate in the social activities of the school, and they enjoy the benefits and pleasures of home care at the ages when they are so greatly in need of it.

A case study in training. Miss Daniels's¹ résumé of a deaf child's training gives us a glimpse of how the patient and sympathetic specialist directs the development of the deaf child into a happy and useful citizen:

The baby's name was George. He was nearly a year old. His mother held him on her lap and his dad whistled to him, but he did not turn around. "He must be stubborn," the mother said, "because when his dad claps or whistles to him he always laughs." But this time dad was behind the baby. After much repetition and observation George was taken to a hospital and there the verdict given was, "The child is deaf; there is nothing we can do for him."

All attention was then turned to George's training. When he was nearly three years old he was sent to a private school, as a day pupil. He entered a class of children from two to three years of age.

¹ Acknowledgments of thanks are made to Margaret E. Daniels, of the primary and grammar department of the Kendall School, Columbia Institute for the Deaf, Kendall Green, Washington, D.C., and to the *Child Welfare* magazine, for permission to reprint this article published in *Child Welfare*, October, 1929.



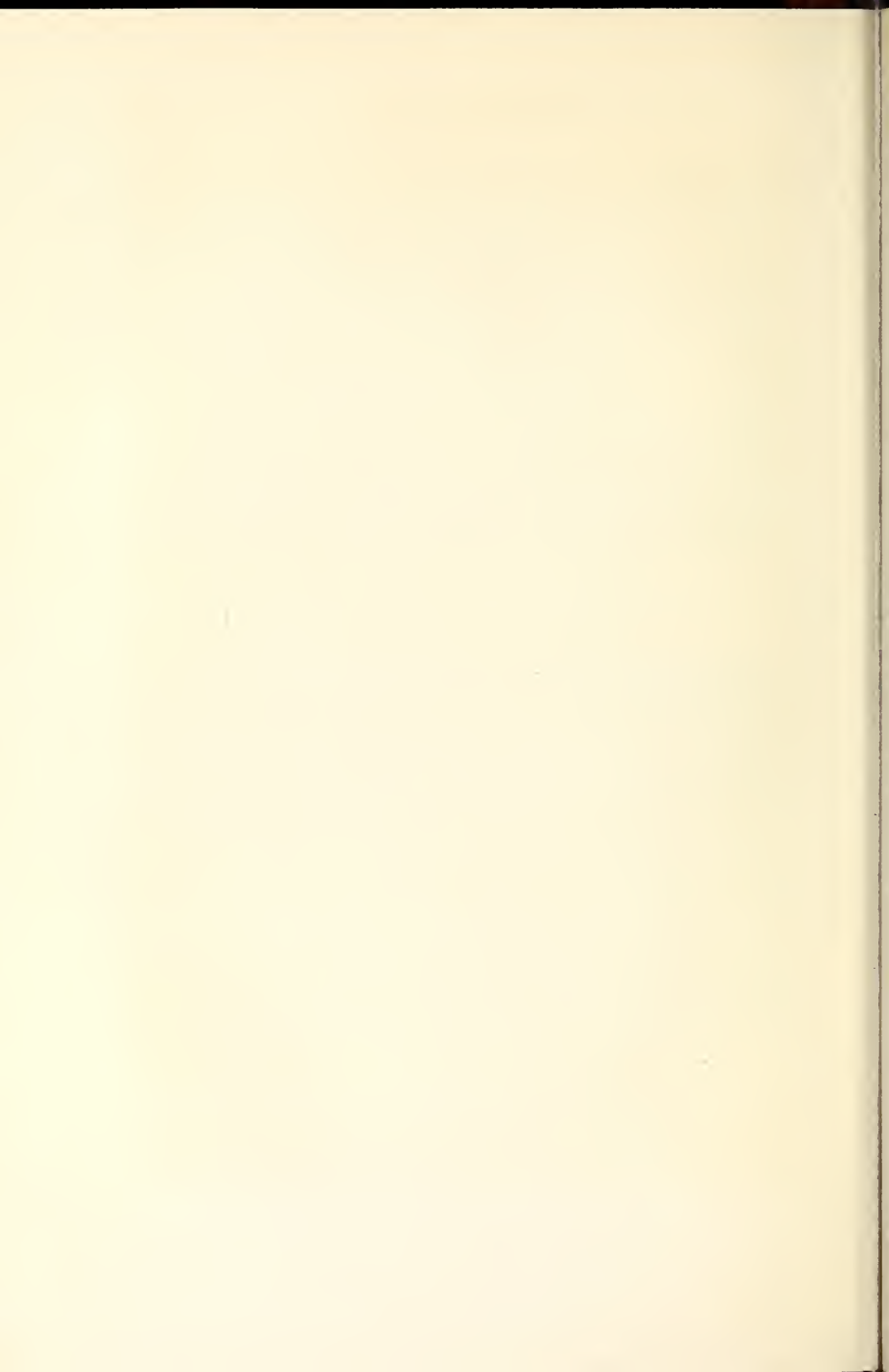
A RHYTHM CLASS

"Fingers serve as ears in getting the beat of the music."
Kendall School for the Deaf, Washington, D.C.



A SPEECH CLASS

Kendall School for the Deaf, Washington, D.C.



This class was made up of three little girls, the youngest twenty-three months old, and two other little boys. The children liked playing in the big, sunny room. George liked the blocks — round, square, and other shapes. The children had many toys — some buttoned, some tied and others hooked. They liked to play with teacher; they watched and imitated the movements of her arms, her feet, her head, then her lips, and last of all the gymnastics of her tongue. George, never having used his tongue for talking, found he had to try many times before he could move it about with ease. The children liked to blow the candle; first it was near, then farther away, and they drilled to strengthen their breath control. This was the beginning of speech, because their lips formed the consonant element *wh*. It was fun to see the feather dance or the corner of the teacher's handkerchief fall over in this drill for making the breath consonants. When George laughed he could feel in his throat funny movements that he could also feel in the teacher's throat and under her chin as he held his hand there. The teacher opened her lips a little and George's hand in its position under her chin felt those movements. He tried to make them, and after an effort was delighted to feel the same vibrations in his own throat. They made the Italian element "*a(r)*." Then the teacher closed her mouth and the vibrations went to her forehead and nose. George practiced this and was able to make the element "*m*." All the children learned to do this and took great pleasure in feeling whether the others were doing it right. The first word that George said was "mama." Thus his vocabulary was started, and by means of various devices and much hard drill he made up his sound charts of the vowels and consonants of the English language. Sometimes it takes three or four years before a child has enough control of the muscles governing the organs of speech to be able to form all of these elements.

Along with speech training, George received training in lip-reading. The teacher made pictures with her lips that meant that he must pick up a toy fish, a shoe, a ball, or a doll. Sometimes they meant that he must run, jump, fall, or wash his hands. He knew the children's names. He worked very hard to play these games with his teacher and the other children, as all deaf children must do to overcome their handicap.

When George was five years old he realized that he lacked something that other children in his neighborhood had; they could make their lips move quickly and they did not use their hands when they

wanted something. He did not understand the games they played. So he was much happier in school, where the children understood each other and the grown-ups knew what he wanted.

George learned that everything one has and everything one sees or does has a name. But it is hard for a little deaf boy to remember all these names which he comes in contact with so seldom in comparison with the child who hears. At six years of age he put aside some of his toys and started general school work — reading, and writing words and numbers. He liked to write and use his hands for the many drills of coördination. He never wrote a word which he could not speak. He learned the colors. He had a game to play with the calendar about “to-day,” “to-morrow,” and “yesterday,” and how the days add up to weeks and then to months. He drew a picture of the sun on “to-day” if it was a pleasant day or of raindrops when it rained. He learned the holidays by putting pictures on their places in the calendar. He learned to ask for things he wanted at the table; he knew the names of the vegetables, meats, and fruits. It was great fun for him to make charts and scrapbooks from the pictures of animals, flowers, and other things he cut out of magazines and catalogues.

When he was nine he could read simple stories, tell of things he had seen, ask for what he wanted, count, and understand simple arithmetic problems. He was alert and ready to study history, geography, and other topics. At first the teacher made history books, in language he could understand, about the principal facts of American history. After that he was able to use the regular first history book. They used the same method in studying geography. First he learned who sat in front of, behind, and alongside of him. He drew a map of the classroom, of the school building and its rooms, of the campus, and then of the city. He learned directions and locations. After this he was ready for the school geography, but he had much to learn of language as he studied the geography lessons.

He had a language book starting with simple stories with language drills on verb conjugations and elliptical sentences and ending with stories illustrating difficult language formations. The teacher had many pictures of different scenes which he had to describe or write an imaginary story about. Writing news items in his daily journal also improved his language ability. Thus George continued, with an alertness equal that of any boy his age, to express himself and learn fully the language in his textbook.

He was also fond of rhythm work. He called it singing, but it really was keeping the rhythm of the tune and not the tone. Even when he was three he liked to feel the vibration as the teacher played the piano. Soon he learned to detect a difference in these vibrations. Without looking he knew their place on the keyboard. He could recognize the number of chords played. He mimicked slow playing, soft playing, or fast playing by skipping, flying, or running. The deep tones meant the giant's walk. He learned to accent his words from piano chord combinations, and then he did phrasing and nursery rhymes. George was gifted with the love of song; he felt rhythm in his whole body. With his eyes closed he could tell by touch which one of a group of songs the teacher was playing. Sometimes he felt this vibration on the floor and could pick out the song. He became the leader of a toy symphony orchestra. This rhythm work made George's speech more fluent and less mechanical than that of a deaf child who does not have such training.

George is now specializing in printing as a means of future support. He will carry on his work through college, and although born deaf he will overcome his handicap and develop into a boy whose parents will be proud of him.

Every one should know that a normal deaf child has possibilities which are nearly as great as those of any other child. Even though one approach to his intelligence is closed there are other roads, through faith and sight, which may be opened.

Some don'ts. Unwise sympathy for the deaf child, as for all handicapped children, is a great deterrent in efficient training. The following are some fundamental principles¹ that teachers must keep in mind in order to develop a wholesome mental outlook in the deaf child:

Do not be downcast.

Deafness does not, necessarily, bring dumbness.

Do not consider the deaf child as different from other children.

Do not cease talking to him.

Do not speak with exaggerated facial movements.

Do not exempt him from duties and tasks and obedience properly demanded of all children.

¹ Wright, J. D. *The Little Deaf Child*, p. 20. The Wright Oral School, New York, 1928.

Do not let him grow selfish.
 Do not let him grow indifferent.
 Do not be in haste.
 Do not show impatience.

Discovering the deaf and the hard-of-hearing child. As soon as it is suspected that a child may be deaf or hard of hearing, the best ear specialist available should, of course, be consulted. However, even though remedy or cure is hoped for, the special training of the child should be undertaken at once. The early training of the deaf child is of such importance that no time must be allowed to lapse in which the child is not receiving training.

The audiometer. The audiometer is the technical instrument devised for the measurement of hearing. Although

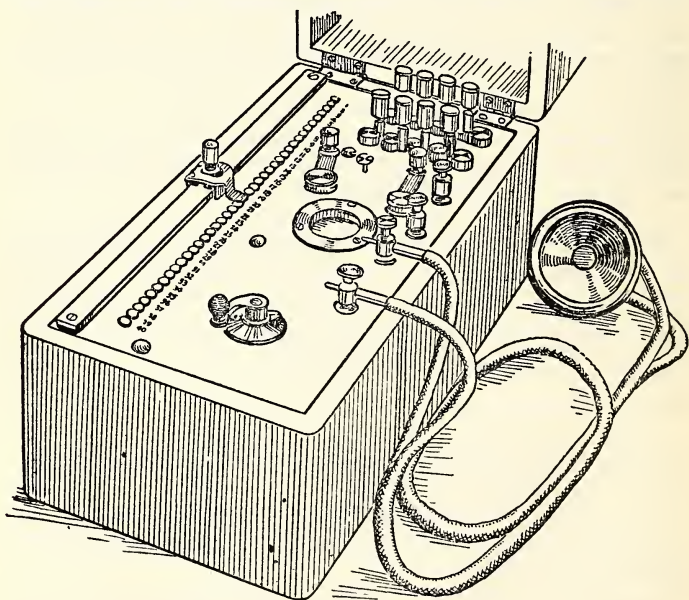


FIG. 51. SEASHORE'S AUDIOMETER
 (Courtesy of C. H. Stoelting Company.)

there are several modifications of the first instrument, its principal constituents, a battery, a microphonic key, two primary coils mounted at the extremities of a scale, and a telephone, are retained.¹

The director² of an oral school for the deaf, who has had an extended experience in the training of the deaf child, has emphasized the fact that residual hearing *may* be present in the apparently deaf child. Speaking constantly to the very young child quite near the ear, two inches or less, in a good, full voice, naturally and clearly, may show that the child hears to a slight extent. On the basis of the law of sound transmission, the intensity of impression upon the hearing mechanism varies inversely as the square of the distance between the ear and the source of sound, the voice near the child's ear is so loud that it may disclose residual hearing not discerned in other ways. A voice one inch from the child's ear makes 1296 times as much impression as it would a yard from the ear, for the square of 36 is 1296. Thus, a child not able to hear a word spoken in an ordinary tone three feet from his ear can sometimes hear that word when spoken a little louder one inch from his ear.

¹ The battery is connected with the microphonic key and the two primary coils. The telephone is held at the ear of the person whose hearing is being tested. The amount of sound can be gradually increased or diminished. The audiometer is now used principally for obtaining a balance of induction from two electric coils acting upon a third. When a varying or interrupted current is passed through the two outer coils, the preponderating current will produce the most induction if the central coil is equidistant. It can be moved to such a point that there will be no inductive effect, one counteracting the other. Thus the position of the intermediate coil measures the relative induction. The telephone is in circuit with the intermediate coil and is used to determine when its position is such that no current is induced in it. The audiometer was invented by Professor D. E. Hughes, of London, in 1879.

² Wright, *op. cit.*, p. 28 ff. Mr. Wright is not an ear specialist, and some of his statements in regard to the deaf child are at variance with recent research. However, his success in the training of the deaf child should give weight to his statements in regard to methods of training.

When it is thought that possibly a child has residual hearing, every opportunity should be taken to repeat very near his ear, words and sentences that would be spoken to him if his hearing were normal.

Residual hearing of children in schools for the deaf. In a survey¹ of American schools for the deaf, an attempt was made to determine residual hearing by audiometric tests. A 3-A audiometer was used for making the tests. In this instrument

a tone having components throughout the entire speech frequency range is electrically generated and delivered to a receiver to be held on the ear of the patient. The volume of the tone is controlled by the same attenuator unit as used in the other audiometers. It reads either in sensation units loss or per cent hearing loss, since it was found for this tone that there were just 100 S.U. between the threshold of hearing and the threshold of feeling for the normal ear. This instrument has been found to be particularly useful in schools for the deaf. It enables the teachers to grade the degree of hearing of the child very quickly, which aids them in deciding upon the kind of methods to be used in teaching him. It is also useful in making a quick test of the hearing of large groups when they are to be tested one at a time.

The purpose of the test was to find the faintest tone that the child could hear. If a child indicated that the test tone was barely audible with the pointer at 40, this meant that the loss of hearing in that case was 40 per cent, that is, his hearing was 60 per cent normal. If the child heard the test tone at 0 or below 0, it would indicate no loss of hearing. If the pointer stood at 100, the loss was total, showing a 0 hearing ability, a point where the ear experiences a tactile and not an auditory impression.

In this manner 4618 white children in schools for the deaf

¹ Day, H. E., Fusfeld, I. S., and Pintner, R. *A Survey of American Schools for the Deaf*, chap. XII, p. 226 ff. National Research Council, Washington, D.C., 1928.

were tested. The following table shows, within each age group, the percentage of the children falling within the different hearing levels as measured by the audiometer, namely, from 0 to 100.

TABLE XXVI. PERCENTAGE CLASSIFICATION OF THE MEASURED AMOUNT OF HEARING OF ALL WHITE CHILDREN TESTED WHO WERE TWELVE YEARS OF AGE AND OVER

Percentage of hearing	Percentage of total number of children according to age										All ages
	12	13	14	15	16	17	18	19	20	21+	
0	1.57	1.89	2.13	2.15	2.89	3.46	3.8	6.09	4.83	6.7	2.94
1-5	5.6	5.84	2.7	4.3	5.78	4.32	5.26	7.52	5.31	10.3	5.19
6-10	6.12	8.53	7.52	7.28	7.39	8.65	7.01	10.39	7.24	10.82	7.81
11-15	9.45	9.63	9.09	7.94	7.55	11.47	7.89	12.18	9.17	9.27	9.2
16-20	13.85	15.32	12.78	13.74	12.05	14.07	12.28	11.11	13.52	8.76	13.14
21-25	14.01	11.84	11.79	15.23	13.66	12.98	13.74	12.54	16.42	11.85	13.29
26-30	9.45	9.63	11.64	8.27	10.12	8.87	9.35	10.03	7.24	11.34	9.70
31-35	8.58	6.63	7.95	7.94	7.87	9.09	10.81	6.81	7.24	6.7	8.01
36-40	6.65	5.21	7.81	6.12	7.55	6.06	9.64	5.01	7.72	6.18	6.77
41-45	5.42	5.84	5.82	7.61	6.59	6.06	6.14	4.3	4.83	5.15	5.99
46-50	3.15	6.	6.67	3.47	5.14	4.76	4.97	5.01	7.72	4.63	5.06
51-55	4.55	2.84	3.83	5.13	3.05	3.46	2.63	3.58	4.34	4.63	3.76
56-60	4.02	2.21	3.12	3.14	2.41	2.81	2.33	1.07	3.86	1.54	2.27
61-65	3.5	2.68	1.98	2.15	3.37	1.51	.87	2.5	.48	1.03	2.27
66-70	1.22	2.05	1.74	1.49	1.28	1.3	1.46	1.43	..	..	1.38
71-75	1.22	.79	1.13	1.32	.96	.21	.29	.35	..	..	.8
76-80	.7	1.1	.85	.66	.48	.21	.87	..	..	1.03	.64
81-85	.7	.79	.56	.99	.48	.43	.29	..	..	..	.54
86-90	.17	.63	.71	.33	.48	.21	..	..	..	..	.34
91-95	..	.15	.14	.33	.48	..	..	..	..	..	.15
96-100	..	.31	..	.33	.32	..	.29	..	..	..	.15

The table shows that the number of totally deaf children, that is, children with no trace of auditory sensitivity as

determined by the audiometer, comprise but a small proportion of the pupils in the schools for the deaf in the United States. Out of 4618, only 136, or 2.94 per cent, were found to be totally deaf. The investigators added that it might be probable that, in the case of a number of the younger children, feeling the vibrations when the audiometer indicated 5 or 10 per cent was mistaken for an auditory impression and was so reported. Should this be the case, it is likely that the number of children registered in the zero column of hearing would be greater.

Another fact disclosed by the table is that there seems to be in the lower age groups, between twelve and sixteen years inclusive, a greater proportion of children with degrees of hearing ability in the upper ranges — between 50 and 100 — as compared with those in the older groups. Also, within the upper age groups, between seventeen and over, there seems to be a comparatively greater proportion of children who are included within the lower hearing levels — between 0 and 50. This may indicate that children with the lesser degrees of hearing remain in school longer, taking more time to complete the course of study. A subjoined table will express this condition more pertinently:

TABLE XXVII. PERCENTAGE DISTRIBUTION FOR EACH AGE GROUP

Degree of hearing	Ages										All ages
	12	13	14	15	16	17	18	19	20	21+	
0-50.	83.83	86.36	85.90	84.05	86.59	89.79	90.80	90.99	91.24	91.70	87.10
51-100.	16.08	13.55	14.06	15.87	13.31	10.14	9.03	8.93	8.93	8.24	12.80
Total.	99.91	99.91	99.96	99.92	99.90	99.93	99.92	99.92	99.92	99.93	99.90

The significant findings in this portion of the study are summarized, as follows:

The median, or central tendency, of the degree of hearing children in schools for the deaf is represented by 21 to 25 per cent as

measured by the audiometer; that is, a loss of from 75 to 80 per cent of normal hearing.

A surprisingly small number, approximately 3 per cent, of the entire number tested for hearing were found to be totally deaf.

A greater proportion of the younger children, between the ages 12 and 16, inclusive, possess hearing within the upper levels, from 50 to 100, than is true for the older children tested.

The median level of hearing in children in day schools is higher than it is in children in residential schools for the deaf, 31 to 35 per cent in the former and 21 to 25 in the latter.

The enrollment in residential schools seems to bear a higher ratio of children within the lower ranges of hearing, from 0 to 50, than is the case in day schools.

The two methods of instruction. There are two general methods of instruction used in training the deaf—the manual and the oral. The manual method is older, and much better established. It includes a manual alphabet and a system of sign language. The system of signs consists of body movements, gestures, postures, mimic actions, and pantomime. The deaf often employ this method with astonishing rapidity and facility. They learn it readily, and as a rule prefer it to the oral method. The adult deaf use it almost exclusively in social intercourse. However, it segregates them from the hearing and emphasizes rather than minimizes their handicap. Many residence institutions use this method either exclusively or predominantly.

The oral method is used almost exclusively in the city day schools at the present time. By this method the child is taught to read lips and to communicate by speech. Later improvements of the method include training in the character of the voice, which as a rule is not pleasing. The obvious advantages of the oral method over the manual are largely responsible for the rapid growth of special classes for the deaf in the city schools. One investigator¹ considers the

¹ Best, H. *The Deaf*. Crowell Company, New York, 1914.

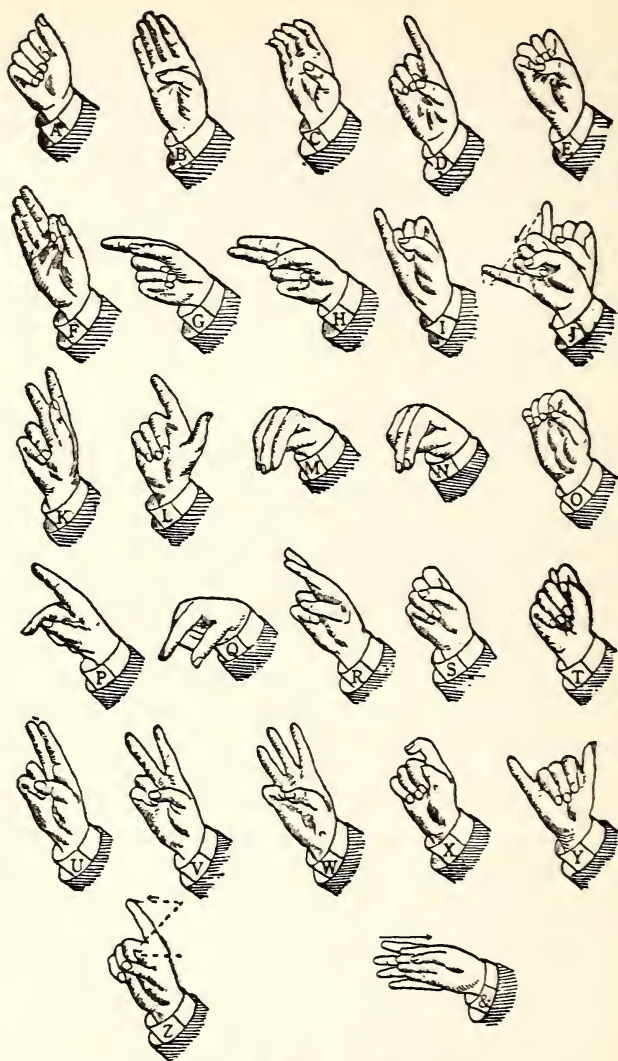


FIG. 52. THE MANUAL ALPHABET

establishment of oral classes in day school in part as a protest against the residence schools which are reticent in adopting the method.

Applicability of the oral method. City day schools use the oral method almost exclusively. A few cities combine the two methods, so that the child uses a combination of speech and signs. Some schools select the brighter children for the oral method, and the duller children for the manual method. Whether all children can be taught the oral method is not known, but it may be inferred that those children who are greatly retarded mentally may not be able to acquire it. Until Pintner and Paterson's research in the field there were no scientific data in regard to the mental status of the deaf child, and questionnaire studies were the only studies that tried to determine the applicability of the oral method. It is interesting to note the range of opinions in regard to the percentage of children who cannot be taught by the oral method, when mere opinions are used in making estimates. Some enthusiasts think the method applicable for all deaf children regardless of mentality, while other responsible workers think that at least fifty per cent of their total deaf enrollment cannot be taught by the oral method.¹

Comparison of residential and day-school pupilage. The predominance of the manual over the oral method in the residential schools may in part be explained by the pupil differences in the two types of schools. A survey² of typical groups of schools for the deaf representative of the American system of education of the deaf, including a total of 4689 children twelve years of age or over, disclosed interesting information in regard to differences and similarities between the pupilage of residential and of day schools.

¹ Horn, L. H. *The Education of Exceptional Children*, p. 247. The Century Company, 1924.

² Day, Fushfeld, and Pintner, *op. cit.*, chap. xi.

Sex distribution. In regard to sex distribution, there was very little difference between the two types of schools; in both types boys predominated in practically the same ratio as is shown in the following table:

TABLE XXVIII. DISTRIBUTION OF DEAF PUPILS ACCORDING TO SEX

	Residential schools		Day schools		Total	
	Number	Per cent	Number	Per cent	Number	Per cent
Boys.....	2,160	53.9	365	53.4	2,525	53.8
Girls.....	1,846	46.1	318	46.6	2,164	46.2
Totals...	4,006	100.0	683	100.0	4,689	100.0

Nativity of pupils. In regard to birthplace of pupils, however, there are greater differences. One twentieth, or 4.9 per cent, of the deaf school population is foreign-born, but the percentage of foreign-born in the day schools is considerably greater than in the residential schools, as Table XXIX shows.

TABLE XXIX. NATIVITY OF DEAF PUPILS

	Total	Native	Per cent of total	Foreign-born	Per cent of total
Residential schools.....	3,835	3,690	96.2	145	3.8
Day schools.....	690	613	88.8	77	11.2
Total.....	4,525	4,303	95.1	222	4.9

Since day schools are established in large urban industrial centers, the existing condition is to be expected.

Age when hearing was lost. The age at which hearing was lost has been found to be significant in relation to the general intelligence of the child. A comparison of pupils of the two types of schools in regard to this question reveals significant differences between the two groups. In the residential schools, 47 per cent of the pupils are congenitally deaf, while only 34.9 per cent of the day-school pupils were reported deaf-born. The table showing percentage distribu-

TABLE XXX. AGE WHEN HEARING WAS LOST

Age	Residential schools (per cent)	Day schools (per cent)	Total per cent
1.....	12.4	11.7	12.3
2.....	14.5	10.6	14.0
3.....	5.7	7.4	6.0
4.....	2.9	5.6	3.3
5.....	2.4	4.6	2.7
6.....	1.5	3.3	1.8
7.....	1.4	2.1	1.5
8.....	0.9	2.7	1.2
9.....	0.5	2.0	0.7
10.....	0.7	1.3	0.8
11.....	0.3	0.6	0.3
12.....	0.2	0.9	0.3
13.....	0.2	..	0.2
14.....	0.1	0.1	0.1
15.....	0.02	..	0.02
Unknown.....	9.2	12.2	9.6
Congenital.....	47.0	34.9	45.2
Total.....	99.92	100.0	100.02

tion of ages when hearing was lost shows another significant difference in the greater proportion of children in residential schools who lost hearing at ages of one and two years. The day schools show greater percentages of children at every age when hearing was lost, from the third year on. This shows that deafness occurs at a later age in the pupilage of the day schools.

The table also shows that the early years of childhood are most susceptible to the causes of deafness, as is shown by the constantly decreasing percentage of the occurrence of deafness with each succeeding year.

Parents; hearing or deaf. In the schools studied, information in regard to the parentage of deaf pupils showed only a limited proportion of the children to be the offspring of deaf parents. Table XXXI shows that there were but 2.5 per cent of the total with both parents deaf, and 0.6 per cent with only one parent deaf.

TABLE XXXI. PARENTAGE — HEARING OR DEAF

Parents	Residential schools		Day schools		Total	
	Number of pupils	Per cent	Number of pupils	Per cent	Number of pupils	Per cent
Both parents hearing...	3,750	96.6	675	99.0	4,425	96.9
Both parents deaf.....	107	2.8	5	0.7	112	2.5
Father deaf, mother hearing.....	14	0.4	1	0.1	15	0.3
Father hearing, mother deaf.....	12	0.3	1	0.1	13	0.3
Total.....	3,883	100.1	682	99.9	4,565	100.0

Consanguinity of parents. Later in this chapter we shall note the factor of consanguinity in relation to deaf offspring. It is interesting to note survey findings in regard to this question. Of the children included in the survey, only 7.6 per cent had consanguineous parents, while over 90 per cent had non-consanguineous parents. The distribution of percentages having parents related by blood were about the same — 7.4 per cent of the residential and 9.2 per cent of the day schools. The investigators, however, pointed out a very interesting fact in regard to this question. Although the general ratio with respect to consanguinity in parents was found to be rather low for the total deaf pupilage studied, there was a startling rise in percentage when a number of individual schools were studied. Thus in one school in a Middle Atlantic State, 21.8 per cent of the pupils were found to be offspring of consanguineous marriages; in other schools percentages of 22.9, 24.4, 24.4, and 25.7 respectively were found. In day schools the highest percentage found was 25.7. Table XXXII shows the distribution of the consanguinity of parents, according to geographical divisions. This table includes both residential and day schools. No explanations for the wide divergence between the frequencies in different geographical divisions are made. This is, perhaps, a matter for sociological research.

TABLE XXXII. CONSANGUINITY OF PARENTS OF DEAF
CHILDREN BY GEOGRAPHICAL DIVISIONS

Geographical division	Total number children	Number whose parents are related by blood	Per cent
New England.....	138	11	8.0
Middle Atlantic.....	1,432	102	7.1
East North Central.....	445	22	4.9
West North Central.....	506	24	4.7
South Atlantic.....	526	83	15.8
East South Central.....	397	57	14.4
West South Central.....	440	20	4.5
Mountain.....	174	5	2.9
Pacific.....	283	8	2.8
Total for all divisions.....	4,341	332	7.6

Increase of public day schools for the deaf. According to the *American Annals of the Deaf* for January, 1925, there were 81 day schools in the United States, with a total enrollment of 2658 children, in October, 1924. The day school for deaf children is assuming a constantly greater part in the education of the deaf. A summary of the statistical data published annually in the *American Annals of the Deaf* attests to this steady growth during recent years.

TABLE XXXIII. INCREASE IN ENROLLMENT IN PUBLIC DAY
SCHOOLS FOR THE DEAF

Year	Number of pupils in				Per cent of total who are in day schools
	All schools in United States	Residential schools	Day schools	Denomination and private	
1900.....	10,608	9,504	708	396	6.67
1905.....	11,344	9,930	953	461	8.40
1910.....	12,332	10,478	1,394	460	11.30
1915.....	13,636	11,236	1,907	493	13.98
1920.....	13,653	10,944	2,014	695	14.75
1925.....	16,118	12,404	2,863	851	17.76

These figures clearly indicate the trend toward the expansion of the work of the day school at the expense of other types of schools — public, residential, denominational, and private. The pupilage of day schools in the statistics for

1926 showed them to have 19.06 per cent of the total number of pupils in schools for the deaf in the United States, and for 1927 the percentage was given as 19.36.

Occupations of graduates. The occupations of the graduates of day schools for the deaf show great variety. Of seven day schools giving information on this subject, in answer to a questionnaire,¹ the following occupations were listed (the figure after the name of each occupation indicates the number of schools listing that occupation):

Printing.....	7	Bookbinding.....	2
Auto repairing.....	3	Candy-making.....	2
Carpentry.....	3	Cigar-making.....	2
Dressmaking.....	3	Drafting.....	2
Farming.....	3	Factory work.....	2
Millinery.....	3	Flower-making.....	2
Baking.....	2	Typewriting.....	2

Named once each: Abattoir work, architectural drawing, clerical work, commercial art, comptometry, designing, electrical supplies manufacturing, engraving, hairdressing, jewelry work, leather work, machinist work, metal work, painting, piano parts making, power machine operating, sewing, shoemaking, sign painting, tailoring, upholstering.

The questionnaire was sent to thirteen day schools; only one of these stated that its graduates enter trades taught in school. The percentage of graduates occupied at the time of the survey was conducted was not learned. Only two schools answered in regard to the earning power of their graduates; one estimated that it was from \$8 to \$50 per week, the other from \$15 to \$50 per week.

Trades learned in school. Trades and industries taught in schools for the deaf show great variety. Table XXXIV shows the ten most frequently chosen industries in both the residential and the day schools. Interesting comparisons of industries studied in school and occupations entered upon leaving school can be made.

Percentage distribution of common causes of deafness. According to the 1900 Census there were 37,426 persons in

¹ Day, Fufeld, and Pintner, *op. cit.*, p. 17.

TABLE XXXIV. LEADING INDUSTRIES TAUGHT IN SCHOOLS
FOR DEAF

Residential schools			Day schools		
Industry	Number of pupils	Per cent	Industry	Number of pupils	Per cent
Domestic art.....	1,248	23.7	Domestic art.....	157	23.2
Domestic science..	893	17.0	Domestic science....	122	18.0
Woodwork.....	749	14.2	Sign painting.....	78	11.5
Printing.....	577	11.0	Woodwork.....	71	10.5
Dressmaking.....	292	5.5	Flower-making.....	71	10.5
Shoe work.....	281	5.3	Millinery.....	47	7.0
Tailoring.....	176	3.3	Manual training....	33	4.9
Millinery.....	119	2.3	Printing.....	30	4.4
Painting.....	101	1.9	Beading.....	25	3.7
Ironing.....	97	1.8	Industrial drawing...	12	1.8

the United States enumerated as totally deaf. In 1910 the number of "deaf and dumb" was given as 43,812. One investigator,¹ on the basis of census returns, estimated the percentage distribution of several causes of deafness as follows:

	Per cent
Congenital.....	33.7
Scarlet fever.....	11.1
Meningitis.....	9.6
Unknown.....	6.2
Brain fever.....	4.7
Catarrh.....	3.6
Diseases of the ear.....	3.6
Falls and blows.....	2.8
Sickness (unclassified).....	2.7
Measles.....	2.5
Typhoid.....	2.4
Colds.....	1.6
Malarial fever.....	1.2
Military service.....	1.0
Influenza.....	.7
Brain center.....	.3
Old age.....	.3
Hereditary.....	.3

¹ Best, *op. cit.*, p. 19.

Age of occurrence of deafness. The same investigator who gave us the preceding table has also estimated the percentage of deaf, according to the age of occurrence of deafness, to be as follows:

	Per cent
At birth	35.5
After birth and under 2	16.9
2 and under 4	17.1
4 and under 6	7.3
6 and under 8	4.5
8 and under 10	2.8
10 and under 12	1.8
12 and under 14	1.6
14 and under 16	1.3
16 and under 18	1.0
18 and under 20	0.8
20 and under 40	5.7
40 and under 60	2.4
60 and under 80	1.1
80 and over	0.2

Thus, 35.5 per cent of the deaf are deaf at birth, 52.4 per cent by the time they are two years of age, 73.7 per cent by the time they are five years of age, and 90.6 per cent by the time they are twenty years of age.

The congenitally deaf. Since congenital deafness comprises a little over a third of the total amount of deafness, it behooves us to consider this type of deafness in somewhat greater detail.

For practical purposes the congenitally deaf may be divided into three classes: (1) offspring of consanguineous marriages, (2) offspring of deaf parents or of parents who are members of families in which there is deafness, and (3) offspring of families without consanguinity or deafness.

Census investigations¹ in regard to the matter of consanguinity of the parentage of the deaf showed that 2525, or

¹ Best, *op. cit.*, p. 42.

7.4 per cent of the deaf, have parents who are cousins.¹ Of these cases 60 per cent occurred at birth, and 87 per cent before the fifth year. Of all the deaf born without hearing, 13.5 per cent are the offspring of consanguineous marriages. Thus the proportion of those born deaf is nearly twice as great when the parents are cousins as it is among the whole class of the congenitally deaf. However, "55.0 per cent of the offspring of cousin-marriages have deaf relatives of some kind, and of the congenitally deaf from cousin-marriages 65.6 per cent have deaf relatives; while the respective proportions when the parents are not cousins are 25.5 per cent and 40.7 per cent — in the one case less than half, and in the other two thirds as great."²

Another investigator³ found that although consanguineous marriages formed only about 1 per cent of the total number he investigated, 30.0 per cent of the children of deaf parents who were cousins were deaf, and that 45.1 per cent of such marriages resulted in deaf offspring; but when the parents were not cousins, the respective proportions were 8.3 per cent and 9.3 per cent — only about a fourth and a fifth as great. There seems to be an increased tendency, in the case of consanguineous marriages, to transmit a physical abnormality of deafness.⁴

Deaf having deaf relatives. Census investigations have revealed that about 28.8 per cent of deaf persons who replied to the question have deaf relatives of some kind, direct or collateral. Of this number, 23.5 per cent have deaf brothers,

¹ The investigator states that there were 3341 who failed to answer in regard to this question. If all had replied, the percentage would probably be much higher.

² Best, *op. cit.*, p. 43.

³ Fay, E. A. *Marriages of the Deaf*.

⁴ See Galton, Francis, *Natural Inheritance*, p. 132 ff. 1889; Arner, G. B. L., *Consanguineous Marriages*, p. 65 ff. 1908; Davenport, C. B., *Heredity in Relation to Eugenics*, p. 124 ff. 1911.

sisters, or ancestors. In these cases the influence of heredity is obvious. In the case of the congenitally deaf 40.1 per cent have deaf brothers, sisters, or ancestors, and 46.2 per cent also have deaf uncles, cousins, etc.

Census statistics on offspring of deaf parents show that deaf parents as a class do not have a large proportion of deaf children. The proportion is but a little more than twice as

TABLE XXXV. MARRIAGES OF DEAF PERSONS

Partners in marriage	Total	Result- ing in deaf chil- dren	Per cent	Total	Deaf	Per cent
One or both deaf.....	3,078	300	9.7	6,782	855	8.6
Both deaf.....	2,377	220	9.2	5,072	429	8.4
One deaf, other hearing.....	599	75	12.5	1,532	151	9.8
One or both congenitally deaf.....	1,477	194	13.1	3,401	413	12.1
One or both adventitiously deaf....	2,212	124	5.6	4,701	199	4.2
Both congenitally deaf.....	335	83	24.7	779	202	25.9
One congenitally, other adventi- tiously deaf.....	814	66	8.1	1,820	119	6.5
Both adventitiously deaf.....	845	30	3.5	1,720	40	2.3
One congenitally deaf, other hearing	191	28	14.6	528	63	11.9
One adventitiously deaf, other hearing.....	310	10	3.2	713	16	2.2
Both had deaf relatives.....	437	103	23.5	1,060	222	20.9
One had deaf relatives, other not...	541	36	6.6	1,210	78	6.4
Neither had deaf relatives.....	471	11	2.3	1,044	13	1.2
<i>Both congenitally deaf</i>						
Both had deaf relatives.....	172	49	28.4	429	130	30.3
One had deaf relatives, other not...	59	8	16.3	105	21	20.0
Neither had deaf relatives.....	14	1	7.1	24	1	4.1
<i>Both adventitiously deaf</i>						
Both had deaf relatives.....	57	10	17.5	114	11	9.6
One had deaf relatives, other not...	167	7	4.1	357	10	2.8
Neither had deaf relatives.....	284	2	0.7	550	2	0.3
Partners consanguineous.....	31	14	45.1	100	30	30.0

great when the deaf are married to the deaf as when they are married to the hearing. However, when there are deaf relatives involved in either kind of marriages, or when there is congenital deafness in the deaf parent, the effect is quite marked in the offspring.

The table on page 352 summarizes the results of an exhaustive study in regard to the question of the liability of the deaf to deaf offspring.¹

Sociological work for and by the hard-of-hearing. Deafness greatly depreciates one's economic usefulness in that it is a serious handicap in most normal industrial pursuits. Moreover, deafness is often so depressing and so discouraging that it results in a sense of isolation, causing withdrawal from society. Various organizations have been formed to help the deaf in these respects. The foremost of these is the American Association to Promote the Teaching of Speech to the Deaf. Its aims, briefly stated, are:

to help every deafened person to get more out of life; to seek ways and means for eliminating the cause of deafness; to coöperate with medical and health authorities in enforcing stricter quarantine on diseases that carry deafness in their wake, and to work with otologists in checking incipient deafness; to investigate hearing devices; to promote the teaching of speech-reading; to encourage the formation of clubs and leagues for the deafened; and to help in solving the employment problems of the hard of hearing.

Under the encouragement of this association, some sixty Leagues for the Hard of Hearing are now organized in the United States. Their aims — alleviation, education, prevention, and employment — require the activities of intelligent, energetic, and altruistic members. Most of these

¹ Fay, *op. cit.*, p. 134. This study covered the majority of marriages of the deaf in America at the time it was made (1898). Statistical information is presented for 7227 deaf persons, and for 3078 marriages of deaf with either deaf or hearing persons.

leagues maintain social centers in which they provide lip-reading instruction, needle-work departments, and employment bureaus. They also initiate the organization of classes for the hard-of-hearing school children. Their methods of securing funds ¹ include dues, sales, benefit entertainments, appeals, and gifts. In some cities, as Cleveland, Toledo, Cincinnati, and San Francisco, these leagues are under the Community Chest. Some organizations have trust funds; some have capital funds. Toledo has an endowment fund, and receives an income from renting rooms. Each active league develops strength in certain lines. The Chicago League emphasizes its character and health-building work, and operates an active employment bureau. Toledo and St. Louis stress their employment departments, and are quite successful in placing the deaf even in years of general unemployment.

Achievements and activities of the deaf. Magazines are published to stimulate interest in the deaf by reporting the activities of various leagues, recounting achievements and activities of the deaf, and in many ways offering encouragement and direction. *The Volta Review*, official organ of The American Association to Promote Teaching of Speech to the Deaf, was founded by Alexander Graham Bell and is the outstanding magazine for the deaf. Browsing through a few numbers of this magazine gives one an interest in the deaf, and many concrete suggestions that can readily be utilized in the work of rehabilitation. The deaf themselves find it stimulating. True stories, stimulatingly told, of initiative, courage, poise, and geniality that deaf people learn, are included within its covers, as well as a page of

¹ Bell, Mrs. J. W. "Financing the Work for the Deafened." Given before the session of the Minneapolis League for the Hard of Hearing at the Minneapolis State Conference and Institute of Social Work, September, 1929. University of Minnesota.

jokes containing occasional naïveté “deafly” directed, as for example:

Lip-Reading Success

Mary, Mary, was quite contrary,
But she is no longer so.
She doesn't fear that she will not hear,
She reads the lips, you know!

— *Volta Review*

She could hear perfectly. “There goes Four Bells,” said the ship's officer to the young lady traveler with whom he was conversing. “I must ask you to excuse me. It is my watch below.”

“Aw, quit your kidding,” said the wise young thing, laughing merrily. “Who ever heard of a watch striking as loud as that?”

— *Volta Review*

Lip-Reading Failures

Old man Neff is a trifle deaf,
His wife *will* talk, my dear.
But being wise, he *never* tries
To read her lips, I fear.

— *Volta Review*

The whisper test for hearing. The whisper test is often used by the classroom teacher in testing and reporting cases of defective hearing. While it is not an accurate test, it is of value in that the teacher has specific data in reporting a case since a common method of recording is followed.

Procedure. Mark off a distance of twenty feet on the floor by five-foot intervals. Require the child to stand at a distance of twenty feet and with a side of his body toward you. Ask the child to cover with his hand the ear away from you. Speak in a loud whisper proper names and numbers with which the child is familiar and ask him to repeat what you say. If he is unable to do this at a distance of twenty feet, move five feet closer and repeat the procedure. If necessary, move closer, five feet at a time, until you whisper directly into the child's ear. Test each ear separately.

Record the hearing for each ear separately as a fraction of which the denominator is always 20 and the numerator is 20,

or 15, or 10, or 5, or 0, according to the distance at which you stood when the child was able to repeat the whispered words (for example: 20/20, 15/20, 5/20, etc.). If the child is unable to repeat the words when whispered directly into his ear, record the hearing as ?/20. In choosing words to be whispered, avoid those which have a hissing sound.

CASE STUDIES

1. *A deaf baby*

The case. Mr. and Mrs. B. have a very active baby boy, just six months old. The parents spend a great deal of time each day playing and talking to the baby. A few weeks ago the mother noticed that the baby did not turn his face toward her when she called to him, although he would begin to laugh and squirm as soon as he saw his mother's face. She went in back of the child and clapped her hands; the baby gave no sign that he heard her. She took two blocks and clapped them together sharply; the baby continued to ignore her. She wheeled his cab into the kitchen and struck the kitchen range a hard blow with the stove poker, the baby jumped in a startled way.

Queries. What special training would you suggest for this baby? When would you begin with special training?

2. *A deaf kindergarten child*

The case. Donald, a handsome boy of superior intelligence, is totally deaf. His parents, who are superior people, did not discover the child's defect, even though Donald did not talk. The mother has been employed ever since Donald was two years of age, and the child has been cared for during the day by a nursemaid. Occasionally the parents wondered why their child did not talk, but friends told them of children who did not begin to talk until they entered school, and then made more rapid progress than children who began to talk early.

Within a few hours after Donald entered kindergarten his teacher recognized that Donald could not hear, and by the end of the day his hearing had been tested and his total deafness was assured. He is now attending a special school for deaf children. The student who investigated the case was not able to obtain Donald's I.Q., but was assured that he is classed as a superior child. The student's

observation of Donald's activities in the classroom, upon repeated visits to his school, convinced her that the child was superior mentally to hearing children of the same age.

Queries. How would you explain the fact that supposedly intelligent parents failed to discover that their child was totally deaf? How can you excuse supposedly intelligent parents in failing to investigate when a child did not talk by the time he was five years of age? How could the child's training have been improved had the defect been discovered three years earlier?

SELECTED REFERENCES

1. Best, H. *The Deaf*. Crowell Company, New York, 1914.
2. Day, H. E., Fusfield, I. S., and Pintner, R. *A Survey of American Schools for the Deaf*. National Research Council, Washington, D.C., 1928.
3. Greenberger, D. "Doubtful Cases"; in *American Annals of the Deaf*, vol. 34, no. 2, p. 93 ff.
4. Hall, P. *Education of the Deaf*. Bulletin no. 14, Department of the Interior, Bureau of Education, Washington. 1921.
5. MacMillan, D. P., and Bruner, F. G. *Experimental Studies of Deaf Children*. Special Report of the Department of Child Study and Pedagogical Investigation, Chicago Public Schools.
6. Newlee, Clara E. "A Report of Learning Tests with Deaf Children"; in *Volta Review*, vol. 21, no. 3, pp. 216-33.
7. Pintner, R., and Paterson, D. G. "A Class Test with Deaf Children"; in *Journal of Educational Psychology*, vol. 6, no. 10, pp. 591-600.
8. Pintner, R., and Paterson, D. G. "Learning Tests with Deaf Children." *Psychological Monographs*, vol. 20, no. 4; whole no. 88.
9. Pintner, R., and Paterson, D. G. "A Measurement of the Language Ability of Deaf Children"; in *Psychological Review*, vol. 23, no. 6, pp. 413-36.
10. Pintner, R., and Paterson, D. G. "The Ability of Deaf and Hearing Children to Follow Printed Directions"; in *Pedagogical Seminary*, vol. 23, pp. 477-97.
11. Reamer, J. C. "Mental and Educational Measurements of the Deaf." *Psychological Monographs*, no. 132.

CHAPTER XIII

THE BLIND CHILD

These eyes, tho' clear
To outward view of blemish or of spot,
Bereft of light, their seeing have forgot,
Nor to their idle orbs doth sight appear
Of sun, or moon, or star, throughout the year,
Or man, or woman. Yet I argue not
Against Heaven's hand or will, nor bate a jot
Of heart or hope; but still bear up and steer
Right onward.

MILTON, Sonnet XXII

Of all types of exceptional children the blind child is least understood, or rather most misunderstood, for much of the literature on the subject of blindness is speculative and fanciful, often wrongly delineating blind personalities. Says Hayes: ¹

The psychology of blindness is still in a stage from which the psychology of the seeing had evolved in the last decade of the nineteenth century.... The blind have had their seers, their poets, and their teachers whose writings are often inspiring and full of wise counsel, but these writings... are "literature of opinion" since they are based upon casual observation rather than upon controlled experimentation. A half-century ago the psychology of the seeing was in a similar intuitive stage and only after many "battles royal" has psychology advanced from a general philosophy of life and conduct to a science based upon experiment — in education, in business, in psychotherapy. Scientific literature on the psychology of the blind is meager and widely scattered. A considerable number of American and European psychologists have at one time or another made brief studies of single phases of the subject, and there have been a few attempts at a summary of evidence, but so many

¹ Hayes, Samuel P. *Ten Years of Psychological Research in Schools for the Blind*, p. 9. Pennsylvania Institution for the Instruction of the Blind, Overbrook, Philadelphia, 1927.

topics have not been touched at all, or so unsatisfactorily, that one is justified in calling the experimental psychology of blindness an untilled field.

While these limited studies cannot give us a complete picture of the blind child, they can give us an accurate picture of some of his traits.

Frequency of cases. The total number of blind children enrolled in our public and private schools during the school year 1926-27 is given as 6084.¹ This number is exclusive of the sight-saving classes. Several studies have been made that seem to warrant the general statement that in the United States, of every ten blind persons, one is under twenty, four are between twenty and sixty, and five are over sixty years of age.² The total number of blind in our country, according to Census returns of 1920, is given as 52,567. However, this number is known to be far below the actual number of persons who are blind, according to the generally accepted definition of the ophthalmologists. The previous report referred to estimates, after a rather careful analysis of the figures obtained through commissions for the blind in four States, that the United States Census figures for 1920 are approximately only two thirds of the correct number.

1. *Causes of blindness*

The causes of blindness are many, but may be grouped into three general classes — heredity, disease, and accident.

¹ *Schools and Classes for the Blind.* Department of the Interior, Bureau of Education, Bulletin no. 9, 1928. Washington, D.C. Eighty institutions were included in the report of this blind school population of the United States. Of these institutions, 47 were state institutions, 21 were schools or classes in city school systems, 5 were private institutions, and 5 others private schools supported partly or largely by state funds. Of the total 6084 enrolled, 3355 were boys and 2729 girls, 3499 pupils were enrolled in industrial courses, 2688 in instrumental music, and 2729 in voice culture.

² *Report of Commission to Study Conditions Relating to Blind Persons in Pennsylvania.* Harrisburg, 1925.

Heredity. In order to determine to what extent blindness is transmissible a study was made of the United States Census returns.¹ Of 29,242 cases of blind individuals for whom special schedules were secured, it was found that 3221, or 11 per cent of blind persons, have blind parents, brothers or sisters, or children. The following table shows the distribution of blind having blind relatives:

TABLE XXXVI. PERCENTAGE DISTRIBUTION OF 3221 BLIND INDIVIDUALS HAVING BLIND RELATIVES

(Compiled from Best)

Having blind parents only (one or both)	24.1
Having blind brothers or sisters only	61.4
Having blind children only	4.2
Having two or more classes of blind relatives	10.3
Having blind parents, brother or sisters, and children	0.3
Having blind parents, and brothers or sisters	8.4
Having blind parents and blind children	0.5
Having blind brothers or sisters and children	1.1
	<hr/> 100.0

This table shows that in certain families blindness is evidently the result of the influence of heredity. In some schools it has been found that there are pupils whose blind ancestors can be traced back several generations. In certain schools there have been a number of pupils, all, respectively, the progeny of a single blind couple.²

Blindness due to hereditary factors may be conveyed more or less directly by the inheritance of anomalies of the visual apparatus, by the passing on of some infirmity affecting some part of the organs of sight, or by passing on a predisposition to blindness in the existence of a certain physical condition which may sooner or later induce blindness under propitious conditions, such as disease.

¹ See Best, Harry. *The Blind*, p. 126 ff. The Macmillan Company, 1919.

² *Ibid.*, p. 128.

Hereditary influence of disease. The most extensive investigation in regard to the hereditary influence of diseases upon blindness was conducted by Loeb.¹ From an examination of reports furnished by oculists and by institutions for the blind, and from the review of medical literature on the subject, covering a period of fifty years, a record was made of 1204 families in which hereditary blindness was found to

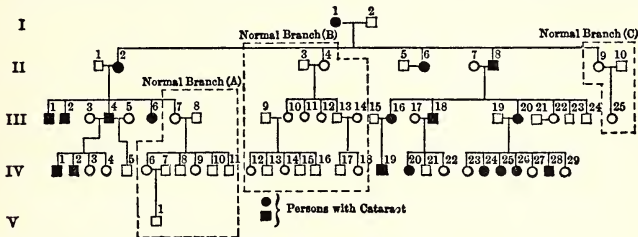


FIG. 53. PEDIGREE OF HEREDITARY CATARACT

The squares represent males, the circles females. (After Davenport and Laughlin.)

occur. In these families there were 4155 children, of whom 2523 were affected. The diseases discovered in this study that were liable to result in blindness were only twelve. The table (Table XXXVII) shows the several diseases, the number of families affected with the per cent distribution, and the entire number of children born to them, with the number and percentage of children affected.

From Table XXXVII, it seems that in one third (33.6 per cent) of the families the disease causing blindness is cataract; in nearly one fourth (23.7 per cent) retinitis pigmentosa; in one eighth (12.4 per cent) atrophy of the optic nerve. These three diseases together are responsible for more than two thirds (69.7 per cent) of all blindness. In cataract the influence of heredity seems to be the more pronounced the

¹ See *Annals of Ophthalmology*, 1909, vol. 18, p. 1 ff. This investigation was not confined to America alone, but included European countries as well. See also *Outlook for the Blind*, 1909, vol. 2, p. 162.

more intimate its form — that is, the proportion for direct heredity with both parents affected is 50.0 per cent; for direct heredity with but one parent affected, 42.1 per cent; for indirect heredity, 25.7 per cent; and for collateral heredity, 18.7 per cent.

The diseases listed probably represent nearly all having a part in hereditary blindness. Myopia and astigmatism, though they do not necessarily constitute full blindness, have been added.

The hereditary influence of most of these affections are seen to be pronounced, and their part in the causation of blindness is evident. "In all the diseases, defects, or anomalies of the body, no better or more sharply defined examples of heredity are to be found than in the human eye."¹

Effect upon blindness in offspring of consanguineous marriages. Closely related to, or perhaps a part of the question in regard to the effect of heredity upon blindness, is that of the effect of consanguineous marriages upon the blindness of offspring. As we know, there is a certain decided tendency for a defect, physical or mental, to which there may be a family predisposition, even though of a latent character and not found in the parents themselves, to appear in the offspring of such marriages.

Of the 29,242 blind persons reporting in the 1910 Census, 709, or 2.4 per cent, had parents who were first cousins.² Of these, 266, or 37.5 per cent, have blind relatives, as compared with 11.0 per cent for the blind in general. This means that, while persons whose parents were first cousins constitute 2.4 per cent of the blind, they constitute 8.3 per cent of the blind having blind relatives. Thus, the propor-

¹ See *American Encyclopedia of Ophthalmology*, vol. 8, p. 5876. (1916.) Also see *Ophthalmology*, vol. 12, p. 760 (1916), in regard to blindness and heredity.

² Some authorities think this ratio might possibly be too high. See *The Blind in the United States*, p. 118.

TABLE XXXVII. DISEASES FOUND TO HAVE HEREDITARY INFLUENCES UPON BLINDNESS IN 1204 FAMILIES IN WHICH 2523 CHILDREN OF A TOTAL 4155 WERE AFFECTED
(From Loeb)

	Direct heredity. Both parents affected				Direct heredity. One parent affected				Indirect heredity				Collateral heredity			
	Families affected		Children of such families		Families affected		Children of such families		Families affected		Children of such families		Families affected		Children of such families	
	Number	Per cent distribution	Total number	Number affected	Per cent affected	Number	Total number	Number affected	Per cent affected	Number	Total number	Number affected	Per cent distribution	Number	Total number	Per cent affected
Total.....	6	100.0	31	17	54.8	722	2,293	1,319	57.4	113	100.0	385	226	58.7	961	66.4
Albinism.....	...	...	...	...	...	5	17	2	11.8	0	0.0	0	0	0.0	8	48.8
Aniridia and coloboma iridis.....	...	...	...	...	...	59	156	116	74.6	4	3.6	12	8	66.7	9	74.2
Anophthalmus and microphthalmus.....	...	...	...	...	...	26	57	40	70.2	3	2.7	4	4	100.0	19	76.8
Atrophy of optic nerve.....	...	...	...	...	...	46	120	56	46.6	43	38.0	155	93	60.0	61	70.6
Cataract.....	3	50.0	15	9	60.0	304	1,012	589	58.2	29	25.7	107	45	42.1	68	61.8
Ectopia lentis.....	...	...	...	...	...	43	155	109	70.3	3	2.7	12	6	50.0	18	88.8
Family degeneration of cornea.....	...	...	...	...	...	18	62	26	41.9	1	0.9	2	2	100.0	13	68.0
Glaucoma.....	...	...	...	...	...	44	131	72	55.0	1	0.9	10	4	40.0	13	62.2
Megalophthalmus.....	...	...	...	...	...	1	1	1	100.0	0	0.0	0	0	0.0	7	72.1
Nystagmus.....	...	...	...	...	...	18	56	26	46.4	3	2.7	11	11	100.0	9	72.5
Ophthalmoplegia and ptosis.....	1	16.7	6	3	50.0	32	121	77	63.6	1	0.9	1	1	100.0	5	76.5
Retinitis pigmentosa.....	2	33.3	10	5	50.0	126	405	205	50.6	25	22.1	71	52	73.2	133	64.5

tion of the blind with blind relatives is over three times as great among those whose parents were cousins as it is among the blind as a whole. Of the blind with such relatives, most have blind brothers or sisters; 94.0 per cent have such in conjunction with other relatives; 88.0 per cent such alone. With respect to the age at which sight was lost, there was a tendency to an earlier period in the case of the blind with parents who were cousins, and to a later period in the case of the blind without such parents; the differences were especially pronounced among those blind at birth and among those becoming so in advanced years.¹

Blindness in relation to general diseases. About four fifths of all blindness is due to diseases affecting the eye in one way or another. Much of this is due to diseases of infectious character, and certain ones are more common with the years of childhood and adolescence, such as scarlet fever, measles, mumps, meningitis, typhoid fever, smallpox, and similar affections. Others are infections of a venereal nature, which seem to have an influence upon the organs of vision.² A very large portion of blindness resulting from disease may be prevented by fitting medical and surgical measures. There are several specific diseases of a highly contagious character that usually appear in the years of childhood and youth in regard to which the possibilities of prevention have been manifested. Of these, the two main diseases are ophthalmia neonatorum ("babies' sore eyes"), and trachoma.

¹ See Arner, G. B. L. *Consanguineous Marriages*, p. 64. (1908.) Arner says that of the offspring of consanguineous marriages, only 0.25 per cent have been found to be blind, and only 0.05 per cent congenitally so. Contrasted with the ratio for the general population, the chances of such offspring are 632 per million when the parents are cousins, to 63 per million when they are not related; the chances thus are ten times as great in the one case as in the other.

² Syphilis is said to be the cause of nearly all congenital blindness and malformation of the eye. See *Ohio Bulletin of Charities and Correction*, vol. 17, p. 28. (December, 1911.) See also *Iowa Medical Journal*, vol. 15, p. 279. (1908.)

The percentage of pupils blind from ophthalmia neonatorum who are annually admitted into residential and day schools for the blind varies between approximately 27 per cent and 13 per cent. In a survey of two residential schools for the blind in Philadelphia and in Pittsburgh, reliable data as to the causes of blindness of pupils enrolled were gathered.¹ When the new admissions to the two schools were distributed into five-year periods of a total thirty-year period, the percentage blind from ophthalmia neonatorum are as follows:

1895-1899	21.4 per cent	1910-1914	22.8 per cent
1900-1904	25.6 per cent	1915-1919	24.7 per cent
1905-1909	32.5 per cent	1920-1924	17.4 per cent

While no conclusions were reached by the committee making the investigation, it was pointed out that the publicity given to the prevention of blindness from this cause had some effect, after a peak was reached in 1905-09.

Trachoma, or granulated lids, producing small eruptions, or "granulations," under the eyelids, is, according to the Census, with "sore eyes," the cause of between four and five per cent of all blindness. Of the persons affected with it not all lose their sight, but a very considerable proportion eventually do, most of these becoming partially, but effectively, blind. This disease is spread chiefly by the use of unclean appliances, especially by the common towel or wash basin. Trachoma is found in various parts of the country, but is chiefly concentrated in particular sections. It is quite prevalent among certain classes of the foreign-born. It is also common among some of our native Indian races.²

¹ *Report of Commission to Study Conditions Relating to Blind Persons in Pennsylvania*, p. 15. Harrisburg, 1925.

² See Publications of National Committee for the Prevention of Blindness, *Publications*, no. 6, p. 25. (1915.) Also *Report of United States Public Health Service*, p. 24 (1912); p. 257 (1913). Of 39,231 Indians examined by the federal authorities in 1913 and 1914, 8940, or 22.7 per cent, were with trachoma.

Compulsory reporting to the health authorities of cases, quarantining of actual and suspected cases, and the periodic examination of school children and of others likely to be affected, are the best preventive measures for trachoma.

Blindness in relation to accidents. Accidents or injuries may produce blindness, either directly by damaging the eye or indirectly through intracranial lesions which tend to destroy sight through injury to the optic nerve by severance, laceration, or by atrophy following inflammation. When eyestrain and poisoning (as from wood alcohol) are included with industrial accidents and accidents from carelessness, the total amount of blindness caused by this group of factors is slightly over one sixth of all blindness.¹ With increased precaution regarding eyestrain in schoolrooms and workshops, protection from accident in industry, and guarding children against the use of sharp tools and implements and toy firearms, this high percentage of blindness from this class of causes is being reduced.

The deaf-blind. In every State in the Union a small but very needy and deserving group of blind people is represented by those who have the double handicap of blindness and deafness. Laura Bridgman and Helen Keller are the most widely known cases of this type. Their accomplishments have demonstrated the possibilities in the training and development of superior minds bereft of the two most commonly used senses.

Laura Bridgman's entire education was institutional; she was taught at the Perkins Institution for the Blind. Helen Keller's training was almost entirely under a special teacher. For a short time Miss Keller attended the same institution where Laura Bridgman received her training. The education of other deaf-blind children has been undertaken in various parts of the country.

¹ See Best, *op. cit.*, p. 173 ff.

Whether these doubly handicapped children can be best trained in schools for the blind, or in schools for the deaf, is a moot question. The progress of a deaf-blind child in the public school of Newark has been reported to be satisfying to the child herself and gratifying to her teachers.¹ The child, totally deaf and totally blind, spends her day alternating between the classrooms for the deaf and for those for the blind. She is deft with her needle and can make many pretty things. Her days are varied. She writes ably on the typewriter, and can read and write embossed Braille. Teachers and pupils converse with her by spelling the manual alphabet for the deaf in the palm of her hand, and she speaks her replies with distinct enunciation and considerable inflection.

2. *Training of the blind child*

Early training. From earliest infancy a seeing child is persistently educated in regard to size, form, color, and motion of the objects about him. He can see simple causes and results, subtle moods in the facial expressions of those about him, and, while still very young, has formed an adequate conception of spatial relationships.

The rich panorama about the seeing child is blotted out for the blind baby; he is deprived of the multitude of energizing visual stimuli for mental development that are enjoyed by the seeing child. This deprivation hampers the blind child intellectually and limits intellectual development, unless substitutes are supplied. The blind baby's every movement is accompanied by caution and fear. A grasp of his hand may invite a crash of fragile dishes, contact with a hot radiator, or a sharp cut from pointed scissors or a sharp knife. A movement of his head may mean a painful bruise. Any

¹ *Binet Schools of the Public Schools of Newark, New Jersey.* Monograph no. 8, Board of Education, Newark, November, 1921.

step may mean a plunge from a walk, a porch, or down a stairway.

A blind child must be talked to more than a seeing child. He must be brought into contact with more objects, and their nature and purpose explained to him. He must not be permitted to become startled or frightened by unexpected or extremely unpleasant encounters. A fright may leave a nervous impression upon a sensitive organism that may take months or even years to overcome. When he is learning to creep or to walk, he should be provided with a cleared room with an even floor, so that his faulting steps may not precipitate him into danger. He must be permitted to handle all sorts of objects. Means to attract the attention by touch and sound must be devised so that the monotony of mental life is broken, for he must be prevented from forming habits of apathy.

The Binet Intelligence Tests for the blind.¹ The work of adapting intelligence tests for the blind has covered a period of fifteen years. The Hayes 1929 Revision of the Binet scale is a culmination of this work and answers a definite need in the work with the blind. Earlier workers in the field were much impressed with the importance of the degree of vision and the probable differences in mental imagery, according to the age of blinding, and based their arrangements of tests upon the results of the comparatively small number of pupils who had been totally blind from birth or early infancy.

¹ The work of adapting the Binet Intelligence Scale for the blind was begun in 1914 by R. B. Irwin, then supervisor of the department for the blind in the Cleveland public schools. In 1915, Dr. T. H. Haines worked with Irwin, and the next year presented a revision of the Yerkes Point Scale adapted for the blind. During these years Dr. W. B. Drummond was testing the intelligence of blind children in England and Scotland, and in 1920 published a Binet Scale for the blind and a Provisional Point Scale for the blind. In 1923, Dr. Samuel P. Hayes, then of the Perkins Institution for the Blind, prepared and distributed a Provisional Guide for testing the blind. Perfection of Hayes's scale has given us the 1929 revision described in context.

Hayes stressed the practical need for a scale which would measure all children as they came to schools for the blind, as well as the advantage of comparing them with seeing children of the same ages. His experience with the blind led him to minimize the importance of the age and degree of blinding.

The Hayes 1929 Revision gives a full complement of tests, and presents an arrangement much like Terman's revision of the Binet scale. Tests requiring vision had to be omitted. The following list comprises the tests of the Terman revision that were omitted for this reason:

- III 3 Pictures — Enumeration
- IV 2 Discrimination of forms
 - 4 Couping square
- V 2 Naming colors
 - 3 Æsthetic comparison
- VI 2 Missing parts
- VII 2 Pictures — Description
 - 6 Copying diamond
- X 3 Drawing design from memory
- XII 7 Pictures — Interpretation
- XIV 2 Induction test
- XVI 6 Code
- XVIII 2 Paper-cutting

Special difficulties made other tests unsatisfactory for use with the blind. The following tests were omitted for this reason:

- V 5 Patience. Young blind children could do nothing with this test; when beveled pieces of board were used and the test put in the X year group, no clear value could be assigned to it.
- X Alternate 3 Healy-Fernald Puzzle. The discrimination of form by touch seems to be so very different from discrimination by vision that no correlation with intelligence could be discovered.
- V 5 Naming Coins and IX Alt. 2 Counting Value of Stamps. Institution children have little occasion to use coins and they know of stamps only indirectly. A little store game

was substituted for the stamp test. Terman's VIII year coin test was retained but made easier by crediting it if five of the six coins were correctly identified.

- VIII 1 and XII 3 Ball and Field. So much difficulty was found in explaining this test to the children and fairly scoring their replies that it seemed best to reject it. Here again the spatial ideas form a factor which it is impossible at present to evaluate.
- VIII 2 Writing from Dictation, XII 4 Dissected Sentences, X 4 Reading and Report. Blind children vary enormously in their ability to write and read by touch, irrespective of their intelligence. These abilities seem to depend upon opportunity for practice which is often very meager in the case of children who have lost their sight recently or who were neglected at home. A dictation test can hardly be used as a test of intelligence for the blind even if the child reads well, the "dissected sentences" are far more difficult to decipher without the easy back-and-forth movement that vision gives. It seems best to read the fire selection for the child and to use this as a test of memory for ideas.
- XVI Alt. 2 Comprehension of Physical Relations, XVIII 6 Ingenuity, XVIII 1 Vocabulary (75 words). These tests seemed to be too difficult for blind children, even when eighteen years of age.

To take the place of the omitted tests, the following tests, obtained from the sources indicated, were introduced:

- IV 2 Comparison of two cubes
- VIII 1 Knows birthday
- XIV 2 Completing analogies (Goddard and Irwin, *Binet Tests for the Blind*, 1914)
- V 3 Two digits backwards (Drummond, *A Binet Scale for the Blind*, 1920)
- IX 5 Problematic situations
- XVI 3 Generalization
- 6 Proverbs (Herring, *Revision of the Binet-Simon Tests*, 1922)
- X 2 Lines B, C, D
- XII 7 Lines E, F, G
- XVIII 2 Lines H, I, J (Knox, *Alien Mental Defectives*, 1914)

VI 5 Counting irregular series of four to six taps

X 3 Counting irregular series of nine to twelve taps (Kuhlmann, *A Handbook of Mental Tests*, 1922)

In regard to the tests Dr. Hayes says:¹

The 1929 Revision may be considered a fairly trustworthy measuring instrument for testing blind children. The intelligence quotients obtained give approximately a normal distribution curve and retests at two year intervals show about the expected "constancy of the I.Q." The median attainment of the blind is somewhat below that for the seeing but this is not surprising since a similar retardation in educational achievement has long been recognized. The curves of intelligence quotients for the larger schools correspond closely to the curve of all blind children tested, and curves of the school population year by year for a ten-year period in two large schools for the blind show no marked changes in the ability of the children tested. A curve of I.Q.'s obtained when only those tests were included which could be given in the same way to the blind and to the seeing, took the normal form with its median about 10 points below Terman's curve of 1000 seeing children and the 1929 Revision will probably give a similar result.

Education of the blind. For many years the blind were taught entirely in public institutions, usually state supported, although a few were supported by religious organizations. The present-day movement toward the deinstitutionalization of children has included the blind children as well as the less seriously handicapped. An institution may afford more desirable surroundings than those afforded in particular homes, yet institutional life is more or less out of place in modern conceptions of child welfare. The home should be the center of the affections and interests of every child. The public school systems have, therefore, arranged to care for the education of the blind child. Besides receiv-

¹ Hayes, Samuel P. "The New Revision of the Binet Intelligence Tests for the Blind"; in *The Teachers' Forum for Instructors of Blind Children*, vol. 2, p. 4. (November, 1929.) See same reference for entire discussion of this paragraph.

ing the advantages of home life, a blind child, by attending the public day school, is better trained to mingle and compete with seeing individuals by mingling with them in the classrooms, playgrounds, and streets.

In schools providing instruction for the blind, special teachers instruct the blind children in Braille reading, read a great deal of supplementary material to the children, and help the children in the preparation of their school work. For classroom work the blind children enter the regular classes with the seeing. The advantages of club work, auditorium exercises, and playground activities are also open to the blind. Most schools also provide enriched programs for the sightless so that they may have more training in handwork and in music.

With the exception of Braille instruction and practice the curriculum of the blind children is not much different from that of seeing children. Interschool spelling contests, conferences, dramatics contests, debates, orchestral work, and glee clubs are as prominent as among seeing children. New material is constantly being adapted for the blind — nature-study books, graded music books, as well as standard textbooks in various fields. Various devices, used with the sightless, are making it possible to give these children far more material through the ear than they are able to acquire through their fingers. The graphophone has been used for some time in work with these children, and now the dictaphone has been found helpful, especially in the teaching of spelling. The Teachers' Forum ¹ describes a new device with which the German workers for the blind are much impressed. This device, called the *Literaphon*, records sounds on celith, or metal plates or bands, which are unbreakable and can be sent through the mail in an ordinary paper cover.

¹ *The Teachers' Forum for Instructors of Blind Children*, vol. 2, p. 10. (November, 1929.)

These records are ready for use the moment the impression is made, without any further preparation. To make a record of the contents of a book does not take a longer time than a person would require to read the book aloud. The same apparatus is used for recording and for reproducing, and the cost of production is low.

Conservation-of-vision classes, or sight-saving classes. Children having defective vision so as to handicap them in the regular public school classes, and sufficient to enable them to make some use of ordinary print, are now accommodated in special sight-saving classes. It is thought that children with sufficient vision to enable them to utilize ordinary print, even to a very limited extent, will not as a rule resort to finger reading except in the classroom. For this reason public school systems have organized special classes in the conviction that it is better to conserve the vision of these children than to subject them to Braille training.

The objectives of sight-saving classes are to enable the child with defective vision to obtain the regular public school instruction with a minimum of eye-strain, and also to teach each child how to conserve his vision.

The classroom selected for a sight-saving class must have the best natural and artificial lighting conditions obtainable. Accessories are good blackboards and crayon, unglazed paper, heavy, soft pencils, typewriters, and as many books that are printed in large type as are available. The teacher for the class, usually chosen from the ranks of successful teachers in the school system, must possess resourcefulness, energy, and sympathetic interest in the individual child.

As in the case of blind children, the pupils of the sight-saving classes attend the regular grade classes for their recitation work.

Tests for visual acuity. While a few city schools provide

regular examination of children's eyes, the majority do not, and scarcely any smaller schools are able to offer this service. Thus it often falls to the classroom teacher to make preliminary tests of visual acuity. For this purpose many tests have been devised whereby a teacher may have objective

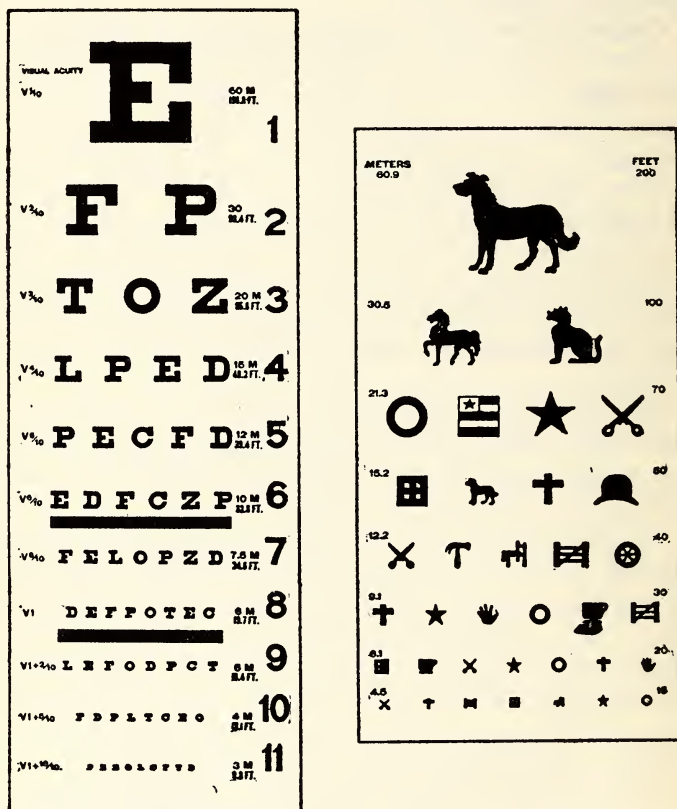
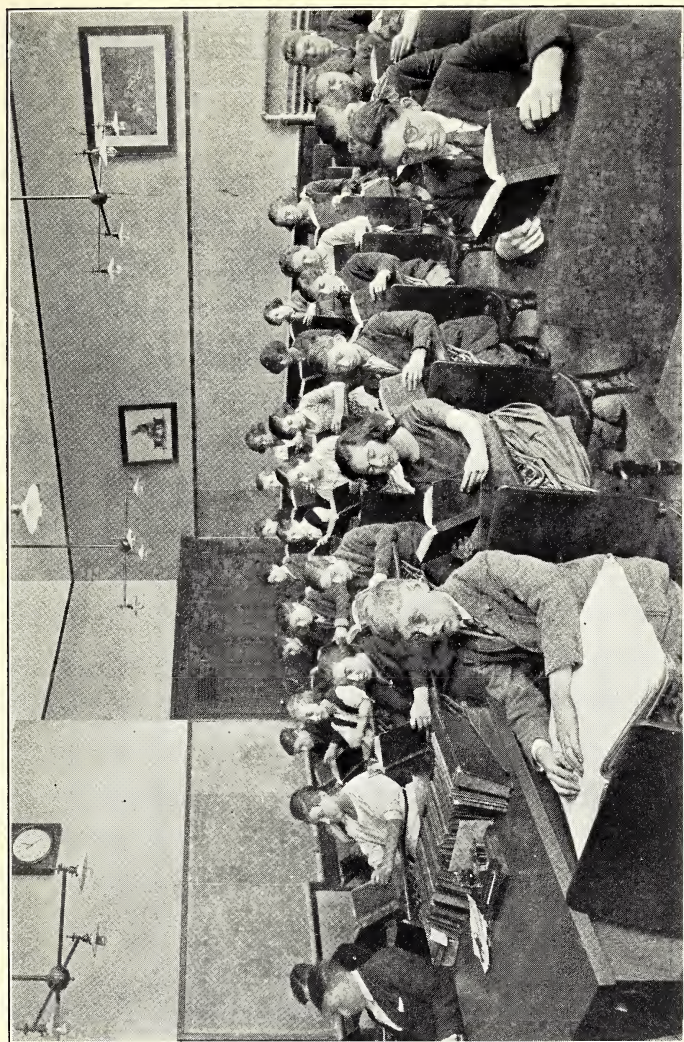


FIG. 54. VISUAL-ACUITY TESTS

1. Lowell's. 2. Seitz's, for children and illiterates.

(Courtesy of C. H. Stocking Company.)



BLIND CHILDREN AT WORK WITH NORMAL CHILDREN

Robert Treat School, Newark, New Jersey.

(Courtesy Newark Board of Education.)



To please my poor slave,
I gave him a sketch of my
whole life; I told him where
I was born, and where I
spent my days when a child.

FIG. 55. TYPE USED IN SIGHT-SAVING CLASSES
Widely spaced lines, and twenty-four-point type.

evidence for asking ophthalmological attention, or for placing a child in a sight-saving class at least until professional attention can be given. Three types of visual-acuity tests are shown here:

1. *Lowell's Visual Acuity Test.* This test is a modification of the Snellen test type chart. Each line of type is numbered with large figures. The test uses letters through and is intended for literates.
2. *The Seitz Test for visual acuity.* This test is intended for children and illiterates. The chart is made up of pictures of a horse, the heads of a cat and dog, a star, shoe, and other objects.

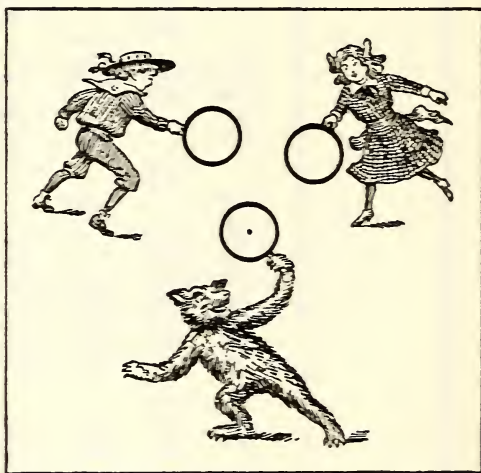


FIG. 56. McCALLIE'S VISUAL-ACUITY TEST

(Courtesy of C. H. Stoelting Company.)

3. *McCallie's Test for visual acuity.* This test is especially effective with small children, foreigners, and mental defectives. It consists of ten test cards each containing a picture of a boy, a girl, and a bear, each with a hoop. The subject is required to locate a ball in one of the hoops.

Minor visual defects. The number of children suffering from minor visual defects is exceedingly large. Although slight defects are considered "minor" in comparison with blindness or semi-sightedness, they often precipitate serious complications. The following excerpt reveals a few actual child problems resulting from minor visual defects.¹

Wherever school children's eyes have been examined, from six to nine out of thirty are found to be nearsighted, farsighted, or otherwise in need of attention. A child is dismissed from school for obstinately declaring that the letter between *c* and *t* in *cat* is an *o*; a pupil in her fourth school year was recently brought to me by her teacher with the statement that she did unreasonably poor work in reading, for an intelligent and willing child; a boy is punished for being backward. These three cases are typical. Examinations showed that the first child was astigmatic and not obstinate; the boy had run a pin into one eye ten years before and destroyed its sight; while the second girl was found to be afflicted with diplopia, and in a friendly chat told me the following story:

"I very often see two words where there is only one. When I was a very little girl I used to write every word twice. Then I was scolded for being careless. So I learned that I must not say two words, even when I saw them."

3. *Training in reading, and for vocations*

Braille type for finger reading. Dozens of embossed types for finger reading were devised within the past one hundred and fifty years. Some of these types were composed of lines, and some of points. The line types were the earlier forms, and imitated characters used for reading by eye. The point system known as Braille, from the name of its maker, after a long struggle for supremacy was finally adopted, in revised form, grade one and a half, by the uniform type committee in 1919.²

¹ Allen, W. H. *Civics and Health*. Ginn and Company, 1909.

² For about ten or fifteen years a battle, unbelievably vehement to those who have not perused the literature of the fray, was waged in the hope of establishing the supremacy of one of two slightly different writing systems

PUNCTUATION

[illegible]

HYPHEN, ETC.

ing ar

	numerical	literal	recurring	see	italic sign	letter sign	capital sign
	Index	Index	decimal	Rule 10	decimal point		
	●	●	●	●	●	●	●
	●	●	●	●	●	●	●
	●	●	●	●	●	●	●
	●	●	●	●	●	●	●

COMPOUND SIGNS

Braille is a system of embossed writing formed by the use of all the possible combinations of six dots arranged in a group, or cell, thus **⠠⠠⠠** each dot being known by its number. Both in reading and in writing, dots 1-3-5 are nearer the beginning of the line than dots 2-4-6; and the sequence of dots is therefore the same in each case. Reading proceeds forward from left to right, while writing on the Braille tablet proceeds forward from right to left. The possible combinations of the six dots give sixty-three signs. Signs occupying more than one cell are termed "Compound" signs.

The Braille system is comprised of sixty-three signs, formed by all the possible combinations of six dots arranged in a group, thus:



called the Braille cell. The first ten letters of the alphabet are formed from the four top dots of the cell; all the other signs in the system are derived more or less directly from them. The second ten letters are formed by adding a fifth dot (lowest left dot of cell) to the first ten letters respectively; the remaining six letters are formed by adding both a fifth and a sixth (lowest right dot of cell). *W* is irregular, because Braille originated in France, where there is no *w* in the language. The punctuation marks are formed from the four lower dots on the cell, and are a repetition of the signs for the first ten letters on a lower level.

Mental aspects of some mechanics of Braille reading. The difficulties encountered in learning to read Braille by touch cannot be comprehended by one who reads Braille visually. Learning the arrangement of raised dots symbolizing words and letters is but one step in the reading process. The blind child must also acquire good reading mechanics if any degree of reading proficiency is to be attained.

A relaxation of the whole body is necessary for continued Braille reading. Extreme nervous tension is a great handicap of sightless children, and is, unfortunately, quite com-

for the blind. The form adopted is called "Revised Braille, Grade One and a Half." Revised Braille as used among the British is printed, some in Grade One, which is full spelling, but chiefly in Grade Two, which is highly contracted. In Grade Two, very many arbitrary abbreviations are used, as *alw* for *always*, *bl* for *blind*, and many combinations of letters, like *ation*, *com*, *ed*, etc. No capital letters are used, and other arbitrary rules and regulations are common, so that Grade Two is not a model of good use. The American Grade One and a Half is merely a simplified or purified Grade Two, and can be read by any one who knows Grade Two.

mon with them. Many types of tics and mannerisms, due to this nervous tension, greatly interfere with attention. In order to insure maximum attention the physical condition of the blind child must be developed so that undue nervousness is not present. The beginning Braille reader must be watched constantly for signs of nervousness, for even blind children who are usually not nervous tend to become so when they are reading. The fine muscular coördinations which, under normal conditions would not be made until there had been greater experience with grosser movements, results in strained attention. This strained attention brings on a tenseness of the whole body, and especially of the hand and arm. Pleasure and interest cannot be sustained for any length of time under this condition. Many teachers thoughtfully intersperse relaxation exercises during the school day of the blind child.

A light touch of the finger-tip is desired in preference to a pressure of the finger-tip. Pressure is an indication of tenseness, or it may induce a nervous strain. However, the desirability of a light touch is based upon more significant factors. From the viewpoint of reading efficiency, a light touch makes clearer perceptions possible; pressure blurs tactual perception.

In regard to the question of using one or two hands in tactual reading, evidence seems to indicate a greater efficiency when two hands are used. Of 1200 people who participated in a Braille reading experiment, 579 used both hands, and 43 per cent of these were found to be in the fastest third of the whole 1200. Other experiments conducted with beginning Braille reading classes, in which the children were taught to use both hands from the first, but later allowed to change to one hand if they wished to do so, found that those who continued with two hands seemed to be faster readers.

A point investigated by the Uniform Type Committee was the matter of reading ahead on a lower line with the left hand before the right had finished the preceding line. In the Committee's experiment only fifteen out of 1200 readers went ahead on the next line in this manner. Twelve of these fifteen, however, were in the faster group of readers. When, in 1925, an experiment modeled after the Committee's was conducted,¹ it was found that nine of the twenty fastest readers went ahead on the next line, and that none of the twenty slowest readers did so. In a careful observation of the free reading of pupils in the Perkins Institution, a number of pupils were found to read ahead a short distance on the next line. Some read ahead only a few letters, while others read ahead two or three words. "It has been estimated that in reading a French Braille book a gain is made of about fifteen pages to the hour by reading ahead as little as five cells on the next line."

Other questions relative to the mechanics of reading Braille, such as the elimination of inner speech and lip movements, word *versus* letter presentation, position of body, and so on, are practically the same as for seeing children.

The height and shape of the Braille dot affects its tactual perception. Experimentation with different shapes of dots has found that a slightly rounded dot, shaped like half a cone, is the most efficient. Too pointed a dot over-stimulates the finger-tips, thus soon fatiguing the pressure spots and stimulating the pain spots. A flat dot seems to spread the sensation, resulting in indefiniteness which interferes with accurate reading.

Experiments directed toward discovering the relative efficiency of different heights of dots used dots of three heights, namely, .025", .022", and .018." The highest dot was chosen because few embossers in this country use a dot

¹ Maxfield, *op. cit.*, p. 51.

that is lower than that; the other two heights were chosen arbitrarily. Few dots are printed anywhere that are lower than the lowest chosen for the experiment. All the subjects of the experiments were experienced readers, and most of them over twelve years of age. The results showed that, of these three heights of dots, more than two thirds of the subjects read the lower dots more accurately and more rapidly. The readers frequently declared a preference for the highest dot, but even in these cases, the experimenters noted a greater proficiency with the lower dots.¹ When the Uniform Type Committee made extensive experiments on the mechanics of Braille reading, it ascertained that reading can be done more rapidly when the reading fingers are held so that they form a narrow acute angle with the plane of the page.

The same investigating committee found that, although 90 per cent of readers have some up-and-down motion of the finger-tips as they read, the best readers do not have this motion to any noticeable degree.

Standardized reading tests adapted for the blind. The scholastic achievement of blind children must constantly be compared with that of seeing children, since they are striving toward overcoming a handicap and competing, as far as possible, with seeing children. Frequent use of standardized educational tests for blind children also is desirable because the blind are taught in small groups, which always hampers fair estimation of the work done. It is gratifying to know that many of the main educational tests are being adapted for the sightless.² Many of the best tests in primary reading require extensive use of pictures or other devices requiring sight and, hence, cannot be adapted for the blind.

¹ Maxfield, *op. cit.*, pp. 41-42.

² As this material is prepared it can be obtained from the American Foundation for the Blind, Inc., 125 East 46th Street, New York.

Two tests, however, not utilizing pictures and ranking among the best tests for use with seeing children, have been embossed in Braille and are proving very practical as tests of the reading ability of children without sight.

The Gray Oral Reading Check Tests, individual tests and standardized for all grades, are embossed in Braille. They require no writing, and are provided with five forms of equal difficulty, so that the children can be tested five times during the year. They are also accompanied by diagnostic charts for each child upon which a detailed record of errors can be made; these, too, are available in Braille. The tests are given to the blind just as they are to seeing children, only that the blind child has Braille before him instead of ink print. The teacher has an ink-printed copy of the Braille material that is before the child. This test measures the skill in the mechanics of oral reading, not comprehension.

The Stanford Achievement Test in Reading has also been embossed in Braille. This test measures three units of silent reading-comprehension; namely, word meaning, sentence meaning, and paragraph meaning. The time limits are made rather high in order to provide for the clumsy Braille materials, so that the test may be a test of reading rather than of motor ability. The time limits for seeing and sightless children, as tabulated below, show some of the inconveniences of testing children without sight.

STANFORD ACHIEVEMENT PRIMARY EXAMINATION TIME LIMITS
(GROSS TIME)

	Seeing	Blind
Test I Reading: Paragraph meaning	16 min.	54 min.
Test II Reading: Sentence meaning	6 min.	24 min.
Test III Reading: Word meaning	6 min.	24 min.

The greater time requirements are necessary, for while the seeing child simply writes his responses on a dotted line, the blind child must manage far more operations. The

exorbitant cost of Braille test booklets, and the difficulty in adjusting the Braille slate to fit the proper space, make a similar procedure for the blind child impractical. Therefore, the blind child must manage a Braille test booklet, a Braille slate and stylus, and his paper, all of which must usually be kept on one small desk with a slanting top.

Supplementary reading material for the blind. The American Foundation for the Blind is experimenting with flash cards, such as the Horn-Shields Flash Cards, to see whether it will be practicable to emboss them for distribution by some Braille publishing house. Three juvenile Braille magazines of national circulation, which are of real interest to children, are in circulation, namely, the *Juvenile Braille Monthly* (Full Spelling),¹ *Juvenile Braille Magazine* (Grade One and a Half),² and *The Searchlight* (Full Spelling).³

Many standard readers such as the Beacon, the Aldine, the Winston, and others, for use either as supplementary material or for the regular text, are available for blind children.⁴ State libraries usually provide circulating libraries for the blind. Libraries in some institutions for the blind have card indices in Braille. An entire library organized under the Dewey Decimal system, with the fly-leaf of each book embossed with its proper numbering in Braille, enables the sightless to find any book wanted when the name of the book or the author is known.

Reading ability of the blind. Providing for extra time for the blind, results so far obtained in comparing the reading ability of blind children with the norms of seeing children show the blind to be somewhat superior to seeing in the

¹ Clovernook Printing House for the Blind, Mount Healthy, Ohio.

² Howe Publishing Society, Cleveland, Ohio.

³ New York Association for the Blind, 111 East 59th Street, New York.

⁴ See Maxfield, Kathryn E. *The Blind Child and His Reading*. American Foundation for the Blind, 125 E. 46th Street, New York, 1928. Bibliography, p. 207, for publishers.

second and third grades, and approximately on a par with them in the higher grades.¹ In order to evaluate the scores properly, however, it must be remembered that most of the blind pupils are older than seeing children of the same grade. While grade achievement of the blind compares so favorably with that of the seeing, age achievement would not.

Vocational training of the blind. The literary training of the blind offers few problems in comparison with vocational training that will actually prepare the blind for a vocation. The handicrafts, such as basketry and weaving, commonly included in the vocational courses in the schools and at which the blind could be occupied successfully, are tending to become obsolete. Factory methods of production are rendering competition difficult. In almost every activity, a blind individual cannot compete with a seeing individual in the quality and quantity of output, so that in practice enterprises for employing large numbers of blind must be subsidized by other income than the productive power of workers. In European countries this has been recognized for quite some time, since efforts to educate and employ the blind were made somewhat earlier there than in the United States. Profiting from European experimentation, efforts in the United States to provide remunerative employment for the blind were made on the assumption that all such employment establishments must be subsidized, or must be willing to operate at a lower profit, or must solicit charitable compensation for products when output is marketed.

In a study² of 337 blind, former pupils of one institution, it was found that the boys were in forty different occupations and the girls in twenty-two, ranging between handwork of a more or less mechanical type to positions of an executive

¹ Maxfield, *op. cit.*, p. 164.

² *Report of Commission to Study Conditions Relating to Blind Persons in Pennsylvania*, 1925, pp. 23-24.

and professional nature that demanded a high order of ability. About 53 per cent of the total group were self-supporting or better, and about 17 per cent contributed to their own support; only 18 per cent were dependent.

The musical ability of the blind. Musical training for the blind is of paramount importance, and has long been emphasized in the school curriculum for the sightless. This general training has been far more extensive in the special schools, and their musical appreciation consequently more advanced than that of seeing children. This has often led to a popular idea that the blind are unusually gifted in music. This is not the case. There is just as great variation in regard to musical ability among the sightless as among the seeing, but fortunately the leaders of education for the blind early recognized music as a source of pleasure and, in many instances, a source of livelihood for the blind.

4. *Sense acuity of the blind*

Sense acuity of the blind. Popular opinion often endows the blind with great acuity of sensation, other than visual. Both popular and classic literature has fostered the idea that a loss of vision is compensated by increased acuity of other sensations, by superior moral qualities, or even by a mysterious "sixth sense."

The weight of experimental findings is against these opinions. Individual differences exist among the blind just as among the seeing, and as a class the blind show no superiority over the seeing. It is true that the blind have been taught to attend to some sensations more closely than have the seeing, but this does not mean that they are capable of keener sensation.

The auditory memory and tactual sensibility of the blind. Bond and Dearborn¹ conducted an experiment to deter-

¹ Bond, N. J., and Dearborn, W. F. "The Auditory Memory and Tactual Sensibility of the Blind"; in *Journal of Educational Psychology*, pp. 21-26. (January, 1917.)

see p 391

mine the auditory memory and tactual sensibility of the blind in comparison with seeing individuals. A group of four tests was given to Perkins Institution (for blind) boys, and to normal students of elementary-school, high-school, and college groups. The tests used for the purpose comprised: (1) a "Reproduction Test," in which the subjects were required to reproduce in writing the elements of a simple story after hearing it read once; (2) a "Retention Test," in which the ability to retain the elements of the story after an interval of five days was tested; (3) an "Immediate Memory Test," in which the immediate memory for lists of letters and figures was tested; and (4) a "Form-Board Test," in which the ability in regard to solving a complicated form-board puzzle was tested.

In the first test the following groups were examined:

1. 254 pupils in grades II to VIII, inclusive, in a grammar school.
On an average of 36 pupils in a grade.
2. 20 pupils in the Rindge Technical High School.
3. 14 students in a class of educational psychology in Harvard University.
4. 18 students in educational psychology in Radcliffe College.
5. 19 pupils in Perkins Institution (for the blind).

The story used for the test comprised 50 elements. That number was used as a basis in giving a percentage-score to each paper. The following charts show the results obtained.

In Figure 58, Chart I shows the percentages of subjects in the various classes capable of reproducing from 67 to 100 per cent of the elements of the story. For example, 100 per cent of the blind boys reproduced between 67 and 100 per cent of the story, but only 60 per cent of the Rindge boys, with whom, in age, training, etc., they are most nearly comparable, reproduced this much.

In Chart II the average abilities of the several groups are compared. The tops of the columns indicate the average

percentage reproduced. The blind boys led with an average percentage of reproduction of 87.7, the Rindge boys having an average percentage of reproduction of 69.9. The Radcliffe and Harvard students had somewhat higher percentages than the Rindge, but considerably less than the blind.

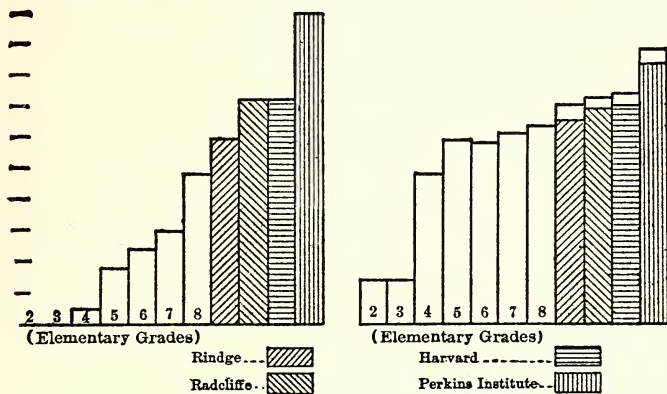


FIG. 58. AUDITORY MEMORY AND TACTUAL SENSIBILITY OF THE BLIND, IN COMPARISON WITH SEEING INDIVIDUALS

Chart I: Percentage of classes of those reproducing 67 per cent and 100 per cent of the elements of the story.

Chart II: Average percentages of reproduction and retention. The tops of the columns represent the average per cent reproduced; the shaded parts of the columns indicate the proportion retained after five days.

(Courtesy of the *Journal of Educational Psychology*.)

The shaded parts of the columns in Chart II indicate that proportion of the reproduced matter which was retained after five days. The actual percentages were as follows:

Perkins (blind subjects)	95.9 per cent	Harvard	95.1 per cent
Radcliffe	95.2 per cent	Rindge	92.4 per cent

The elementary grades were not included in the retention test.

Tests for immediate memory. In the test for immediate memory, 19 boys in the Perkins Institution and 20 boys in

the Rindge Technical High School, of about the same ages, were tested with four lists of letters and three lists of numbers chosen at random. The lists varied from 12 to 15 letters or numbers respectively. Each list was read once, then the students reproduced as many of the units as possible. The blind boys used Braille-writers or typewriters. The tests were marked from I to VII; the first four were letter tests. The results are tabulated below.

Test	I	II	III	IV	V	VI	VII
Rindge (20 seeing boys)	46.9	46.2	46.5	48.6	49.4	65.7	67.2
Perkins (19 blind boys)	55.2	49.9	46.0	44.1	51.4	44.9	54.4

The numbers are percentages correctly reproduced. For example, the Rindge students were able to produce 46.9 per cent of the letters correctly in Test I, while the Perkins Institution boys were able to reproduce 55.2 per cent. The percentages do not indicate a dominant superiority in favor of either group. The seeing boys showed some effect of practice that was not shown by the blind boys.

The same groups of subjects tested in immediate memory were also tested with the form-board test. To test tactual and kinæsthetic sensibility, a form-board puzzle was used into which blocks of various forms fitted exactly into correspondingly shaped depressions. In some cases two or more blocks were required to fill the depression. The Rindge students were blindfolded.

A preliminary period of thirty seconds was allowed each pupil for the purpose of learning the locations of the depressions and the shapes of the blocks. Except for this there was no time limit, but the time required in each case to place each block correctly was noted. Every attempt to place a wrong block was counted an error. The averages of the results are shown below:

	Age	Errors	Time
Perkins (blind subjects)	16 years 8 months	3.8	4.2 minutes
Rindge (seeing subjects)	17 years 5 months	12.6	5.9 minutes
Difference	+ 9 months	+ 8.8	+ 1.7 minutes

The seeing boys were nine months older, required one and seven tenths minutes longer, and made eight and eight tenths more mistakes than the blind boys.

Summary of results of tests. In summary, the blind boys as a group were superior in memory for a passage of prose read to them and were able to retain a somewhat higher percentage of the elements in logical memory. This superiority was shown in comparison with a normal group of boys of approximately their own age, as well as in comparison with adult college men and women. In immediate memory for numbers and letters, however, the blind did not show superiority. The reason for this difference was thought to be that the immediate memory for numbers and letters is, in comparison with the logical memory, a relatively unpracticed ability in the case of all subjects. A higher degree of sensibility to touch and to the feelings of movement and position were shown by the blind subjects.

The study as a whole demonstrated, the investigators explained, to what extent prolonged special training may develop special abilities. The blind had been trained to listen attentively; they must remember what is told them. They had also been trained to attend to tactual sensations; they cannot read Braille books unless their finger-tips are highly trained. For these reasons they have devoted years to the special training of these abilities and attained a superiority over seeing individuals. In the case of immediate memory for isolated numbers and letters, in which they are likely to receive no more training than ordinary individuals, they showed no superiority. This seems to show that the special abilities of the blind are limited to things in which they are specially trained. There is no evidence of compensatory constitutional differences.

The spatial threshold of touch in blind, in comparison with seeing. Many studies by eminent investigators have been

directed toward the tactile sensitivity of the blind. Unfortunately the findings have been quite diverse. Griesbach,¹ in reviewing early work, showed that some experimenters (Czermak, Gärtner, and A. Stern) found the blind to be superior to the seeing in the tactile discrimination of space — the two-point threshold, while another (Uhthoff) found no difference in this respect between the blind and the seeing. Griesbach's own experiments found a slight difference in favor of the seeing subjects. Brown and Stratton² found the spatial threshold of touch for the blind to be lower than for the sighted, and that this advantage was present for each sub-group of the blind, namely, for the partially blind, the totally blind, the partially blind from birth, and the totally blind from birth. They also found that the degree of blindness affected the spatial threshold. The totally blind had a lower threshold than the partially blind. Seashore and Ling³ found that the threshold for the blind was neither lower nor higher than for the seeing, although they found the seeing had a somewhat greater variability than did the blind.

The diversity of the conclusions is undoubtedly due to different methods of experimentation employed. Brown and Stratton used an æsthesiometer made like Braille writing; many fine points were arranged on paper, at regular intervals. The subjects were required to pass their fingers over them as over a page of Braille. It is no wonder that in such an experiment the blind would show superiority, for they

¹ Griesbach, H. "Vergleichende Untersuchungen über die Sinnesschärfe Blinden und Sehender"; in *Archiv. f. d. gesam. Physiol.*, vol. 74, pp. 577-638 (1899); vol. 75, pp. 365-429, 523-73.

² Brown, Margaret S., and Stratton, George M. "The Spatial Threshold in Blind and in Seeing Children"; in *Journal of Experimental Psychology*, vol. 8, no. 6. (December, 1925.)

³ Seashore, C. E., and Ling, C. "The Comparative Sensitiveness of Blind and Seeing Persons"; in *Psychological Monographs*, vol. 25, pp. 148-58. (1918.)

had, of course, been specially trained to attend to just such stimuli. That children of varying degrees of blindness showed varying degrees of discrimination is not at all unusual, for teachers of the partially blind commonly consider partial sight a handicap in learning to read Braille by touch. The partially blind find it difficult to attend wholly upon the sense of touch, and are constantly tempted to use what vision they have. One group of blind in this experiment was able to read Braille not only by touch, but also visually. Only eight subjects had been totally blind from birth.

Acuity of other senses. Seashore and Ling¹ compared sixteen subjects who had been totally blind for more than five years, with fifteen randomly selected high-school students in six tests of sensitiveness, namely: (1) discrimination for the localization of sound, (2) discrimination for the intensity of sound, (3) discrimination for lifted weights, (4) discrimination for passive pressure, (5) discrimination for active pressure, and (6) tactual space (two-point threshold.)

In summary, the study found that "The blind who are skillful in the use of touch, muscle sense, and hearing are not more sensitive or keen in sensory discrimination than seeing persons when fundamental capacities are tested," and that "Development of the use of a sense consists not in the heightening of sensitivity or sensory discrimination but in the development of complexes and meanings in terms of these."

The blind child and perception. We are all more or less familiar with Helen Keller's rich mental life, as she so eloquently describes it in her book, *The World I Live In*. Reading her glowing account of the rôle that olfactory and tactual perceptions play in her mental life gives us glimpses of vistas undreamed of and unappreciated by our visually-

¹ Seashore and Ling, *op. cit.*

leashed minds. This richness of Helen Keller's mental life is not a spontaneous condition, nor a condition that may be developed in all sightless children. Helen Keller's superior ability and the excellent training of her teacher have enabled a mind, bereft of visual and auditory sensations, to achieve an awe-inspiring finesse with remaining senses. In general, the blind do not form detailed auditory, olfactory, kinæsthetic, or tactual perceptions undirected; they seem to be as unobservant as the seeing. Miss Kelly, a teacher of the blind in the Utah School for the Deaf and Blind, has shown us how superficial and unenriched the perceptions of the blind child are when undirected. Reporting at a convention of instructors of the blind, she said:¹

On first acquaintance with the blind, one marvels at the astonishing lack of their powers of observation. One would suppose that, with the lack of sight, that sense through which most of us receive a major part of our sensations, the blind would be abnormally sensitive through other channels of sensation. One would suppose that, with the immense amount of energy and curiosity of youth, the blind would become better acquainted with the world of sounds, touch, odor, and taste than those having their five senses. But this is not the case, for these pupils are below the normal in their observations. Those born blind seem more indifferent to their surroundings than those who have seen. If life is measured by the capacity to respond to stimuli, then the blind are patiently awaiting a day of awakening.

On account of their great limitations, every means should be employed to educate their remaining faculties of perception. Sensations are not knowledge any more than wool is cloth, but they are the raw material out of which knowledge is slowly spun. The capacity for sensation lies at the foundation of all knowledge, happiness, and service.

The sense of touch in the blind is no doubt highly developed as far as reading is concerned, but, on account of a narrow field of experience, they do not distinguish the difference in leaves, flowers, stones, woods, furs, cloths, and so forth.

¹ Twenty-Fourth Biennial Convention of the American Association of Instructors of the Blind, Colorado Springs, Colorado, 1918.

The sense of direction and distance, and comparative measurements, must depend more upon sight than most of us realize, since the blind are so deficient in these senses. For instance, some pupils are never able to walk with perfect ease about a school building in which they have lived for years and are easily lost on their own school grounds. They never learn that the second floor of a school building is some twelve feet higher than the first, though they measure this distance by steps with their leg muscles any number of times during the day. They never realize the distance the ground is below a third-story window when they sit in the window.

Though most sighted children have keen appetites, the blind lack curiosity in tasting and learning to enjoy new foods, thereby limiting their range of diet.

Oral perceptions are not so accurate as those of touch, but are capable of offering quite as much pleasure. The enjoyment of the world of sounds should be limitless to the blind, yet they are not familiar with the sounds and songs of nature and many are not overzealous about music.

The sense of smell occupies a relatively small place in the mental life of most persons, though it may open a wide field of perceptions. The memories of odors are said to last longest. Are not the blind lacking in perception of smell when they do not distinguish gasoline from kerosene and cannot identify the common plants and flowers with most characteristic odors that grow within a radius of a hundred yards of their school building?

Childhood and youth is preëminently the time for cultivating any of the faculties. Of all the mental powers, perception is the most difficult to cultivate after the age of twenty. One may cultivate the thinking faculties with great success in the twenties — not so the perceptive. Whatever we learn early in life will influence us for all future time. If we are taught to regard a thing in a certain light now, all our subsequent perceptions will be colored by that light. The training of the senses is not to see how many sensations one may have, but for the cultivation of such perception as will bring the greatest amount of happiness through an acquaintance with the external world and through their interpretations in literature and life.

This meagerness of perceptual life was Miss Keller's lot also before her remaining senses were cultivated. "Before my teacher came to me," she writes, "my inner life... was

a blank without hope or anticipation, without wonder or joy, or faith." ¹ Of her later developed mental life, she says:

My world is built of touch-sensations, devoid of physical color and sound; but without color and sound it breathes and throbs with life. Every object is associated in my mind with tactual qualities which, combined in countless ways, give me a sense of power, of beauty, or of incongruity: for with my hands I can feel the comic as well as the beautiful in the outward appearance of things. Remember that you, dependent on your sight, do not realize how many things are tangible (page 7).

I know by smell the kind of house we enter. I have recognized an old-fashioned country house because it has several layers of odors, left by a succession of families, of plants, perfumes, and draperies (page 68).

Touch sensations are permanent and definite. Odors deviate and are fugitive, changing in their shades, degrees, and location. There is something else in odor which gives me a sense of distance. I should call it horizon — the line where odor and fancy meet at the farthest limit of scent.

Smell gives me more idea than touch or taste of the manner in which sight and hearing probably discharge their functions. Touch seems to reside in the object touched, because there is a contact of surfaces. In smell there is no notion of relieve, and odor seems to reside not in the object smelt, but in the organ. Since I smell a tree at a distance, it is comprehensible to me that a person sees it without touching it. I am not puzzled over the fact that he receives it as an image on his retina without relieve, since my smell perceives the tree as a thin sphere with no fullness or content. By themselves, odors suggest nothing. I must learn by association to judge from them of distance, of place, and of the actions or the surroundings which are the usual occasions for them, just as I am told people judge from color, light, and sound (page 71).

Human odors are as varied and capable of recognition as hands and faces. The dear odors of those I love are so definite, so unmistakable, that nothing can quite obliterate them. If many years should elapse before I saw an intimate friend again, I think I should

¹ Keller, Helen. *The World I Live In*, pp. 113-14. The Century Company. Acknowledgments are made to Helen Keller and to the Century Publishing Company for permission to reprint this material.

40 Feet

F N Z B D F

30 Feet

O F I C T G

20 Feet

A P E O R F D Z

FIG. 59. SCHOOL VISION CHART FOR CHILDREN WHO CAN READ

Directions for using: Place chart in a good light. Place pupil twenty feet from the chart. Children wearing glasses should keep them on. Examine each eye separately by covering the opposite eye with a card. Have pupil read the letters aloud, beginning at top and reading down. The line of type marked "20 feet" should be read by the pupil with either eye at the distance of twenty feet.

40 Feet



30 Feet



20 Feet



FIG. 60. SCHOOL VISION CHART FOR THOSE UNACQUAINTED WITH THE ALPHABET

Let the person being examined indicate verbally or by motion of the hand the direction of the letter, whether pointing UP, DOWN, RIGHT, or LEFT. The line marked "20 feet" should be read by the pupil with either eye, at the distance of 20 feet.

recognize his odor instantly in the heart of Africa, promptly as would my brother that barks (page 73).

Hold out your hands to feel the luxury of the sunbeams. Press the soft blossoms against your cheek, and finger their graces of form, their delicate mutability of shape, their pliancy and freshness. Expose your face to the aërial floods that sweep the heavens, "inhale great draughts of space," wonder, wonder at the wind's unwearied activity. Pile note on note the infinite music that flows increasingly to your soul from the tactual sonorities of a thousand branches and tumbling waters. How can the world be shriveled when this most profound, emotional sense, touch, is faithful to its service? I am sure that if a fairy bade me choose between the sense of sight and that of touch, I would not part with the warm, endearing contact of human hands or the wealth of form, the mobility and fullness that press into my palms (page 82).

An informal test for vision. The accompanying charts ¹ may be cut from the text and used by the classroom teacher in testing children's vision. While they are not accurate tests, they are of value in that the teacher has specific data in reporting cases, since the letters are of the sizes used in standard tests and a common method of recording is followed.

Procedure. Mark off a distance of forty feet on the floor, by ten-foot intervals. For children who can read letters, use Figure 59. Place the chart in a good light, twenty feet from the child. Children wearing glasses should keep them on. Examine each eye separately by covering the opposite eye with a card. Require the child to read the letters aloud, beginning with the top row. The line of type marked "20 feet" should be read with each eye at a distance of twenty feet. Inability to read this line at twenty feet should be reported. For children unacquainted with the alphabet use Figure 60. Require the child to indicate verbally or by

¹ The accompanying charts are taken from a bulletin of health supervision and instruction for elementary schools of California, published by the California State Department of Education, Sacramento, California.

motion of the hand the directions of the letters, whether pointing UP, DOWN, RIGHT, or LEFT. The line marked "20 feet" should be correctly interpreted at a distance of twenty feet.

Record the results for each eye as a fraction of which the numerator is always 20 and the denominator is the numeral on the chart above the smallest letters that can be read correctly at 20 feet (for example: 20/20, 20/30, 20/40). If the child's vision is so poor that he cannot read any of the letters on the card, place a question mark as the denominator, thus 20/?.

CASE STUDIES

1. *A congenitally blind child*

The case. Marvin S. was born blind. His parents claimed that the mother marked her child during pregnancy by attending a "Blind Boone" musical concert. The parents were prominent people in a small community, but they were not able to send their child to a school for the blind. A prominent superintendent of schools made arrangements for the family to send the child to school at the county's expense. At four years of age Marvin was sent to a boarding-school for the blind. He completed a grade- and high-school training, and then attended a state teachers' college for two more years. He then became a candidate for the superintendency of a school for the blind. Although competing with seeing and experienced men, Marvin was elected. With the aid of an experienced secretary, he is now a successful superintendent. He married a blind girl, who was given a teaching position in the same school. They now have two children, both blind.

Queries. Was Marvin "marked" by blindness? Both Marvin and his wife are now self-supporting; haven't they a right to marry and have children? Since their first two children are blind, wouldn't other children, if they will have more, probably be seeing, since very few cases have been found where blind parents have all blind children?

2. *A limited-vision case*

The case. Mary G. had extremely poor vision. She was an exceptionally bright child, and learned so quickly "through her ears"

that her defective vision was not discovered until she was in the fifth grade. The fifth-grade teacher placed some arithmetic problems on the board, and noticed that Mary was evidently copying her neighbor's work. She examined Mary's work and the neighbor's work, and noticed that they both had the same wrong answer. She sent Mary to the principal's office, with a note explaining that while Mary was well able to work the problem, she had been dishonest. The two papers were also sent to the office as "evidence."

The principal examined the papers sent to her, and noticed that the same strange mistake in the *statement* of the problem appeared on both papers; as stated, the answer appearing on the papers was the correct answer. By tactful questioning the principal discovered Mary's reasons for copying the statement of the problem, gave the child some visual-acuity tests, and discovered that she was not able to see ordinary blackboard writing at a distance of more than fifteen feet.

Since Mary was accustomed to being able to do everything better than her classmates, she never admitted that she could not see as well as they.

Queries. Had you been one of Mary's teachers would you have discovered Mary's defective vision? Can you explain the fact that Mary's parents, people of normal intelligence, did not discover the child's handicap?

SELECTED REFERENCES

1. Best, Harry. *The Blind*. The Macmillan Company, 1919.
2. Bond, N. J., and Dearborn, W. F. "The Auditory Memory and Tactual Sensibility of the Blind"; in *Journal of Educational Psychology*, January, 1917, pp. 21-26.
3. Brown, Margaret S., and Stratton, G. M. "The Spatial Threshold of Touch in Blind and in Seeing Children"; in *Journal of Experimental Psychology*, vol. 8, no. 6. (December, 1925.)
4. Bürklen, Karl. "Das Tastlesen der Blindenpunkscheift"; in *Beihefte zur Zeitschrift für angewandte Psychologie*, 1917, Heft 16.
5. Bürklen, Karl. *Blindenpsychologie*. Barth, Leipzig, 1924.
6. Haines, T. H. "Mental Measurements of the Blind." *Psychological Monograph*, no. 89.
7. Hayes, S. P. *Ten Years of Psychological Research in Schools for the Blind*, no. 4, 1927. Perkins Institution for the Instruction of the Blind, Watertown, Massachusetts. (Pamphlet.)

8. Irwin, R. B. "The Recognition and Training of Blind Feeble-minded Children"; in *Outlook for the Blind*, vol. 9, no. 2, pp. 29-32.
9. Maxfield, Kathryn E. *The Blind Child and His Reading*. American Foundation for the Blind, New York, 1922.
10. Seashore, C. E., and Ling, T. L. "The Comparative Sensitiveness of Blind and Seeing Persons." *Psychological Monographs*, vol. 25. (1918.)
11. Speakman, Martha T. *Recreations for Blind Children*. United States Bureau of Labor, Children's Bureau, Washington. (Pamphlet.)
12. *Teachers' Forum for Instructors of the Blind*, vol. 2, American Foundation for the Blind, 125 E. 46th Street, New York, contains complete bibliographies on various subjects in relation to the blind.
13. Wheeler, R. H. "Visual Phenomena in the Dreams of a Blind Subject"; in *Psychological Review*, vol. 27, pp. 315-22. (1920.)
14. Wheeler, R. H., and Cutsforth, T. D. "The Number Forms of a Blind Subject"; in *American Journal of Psychology*, vol. 32, pp. 21-25. (1921.)

CHAPTER XIV

THE CONGENITALLY WORD-BLIND CHILD

But words are things, and a small drop of ink,
Falling like dew, upon a thought, produces
That which makes thousands, perhaps millions, think.

BYRON

1. *General description, and case studies*

Recent study. Congenital word-blindness has been recognized as a nosological entity for about half a century, but only in recent years is it being considered as a specific defect contributing to the pedagogical retardation of some pupils. In earlier years it was considered an interesting abstraction, but the psychologists who theorized about its characteristics were not interested in the practical consequences of this defect or the practical remedial procedure for overcoming the handicap.

It was not until recent years, when a few pedagogically retarded children were discovered who, when measured by the Binet scale, were found to be of normal or even superior intelligence, that to the phenomenal condition of word-blindness was attributed a renewed interest. An analysis of these children showed conclusively that they failed to advance because they were unable to learn to read, or because they learned to read very slowly. They were *word-blind*. Since much of the school work has to be mastered through the printed page, these children were seriously handicapped. Many of these children were diagnosed as feeble-minded and had been assigned to special classes for mental defectives, although mentally they were normal or merely backward.

Definition. Kussmaul, who in 1877 first recognized ¹ the condition of visual aphasia or dyslexia, designated it as *word-blindness*. Word-blindness is the inability to *understand* or to *interpret* the printed or written characters, although the subject is able to *see* them. The perception of printed symbols is intact, but the imagining, remembering, and interpretation of them is affected. It is an instance of *mind-blindness*, or *psychical blindness*. In *psychical blindness*, visual imagery is obliterated, so visual images or memories of any kind cannot be interpreted. Word-blindness may affect only letters or Arabic numerals, or certain groups of letters or figures, or certain syllables, or whole words or certain groups of words, or certain languages but not others, or musical notes (note-blindness or sensory amusia), or various combinations of these symptoms. Sometimes the condition is accompanied by agraphia ² (loss of ability to write) and very rarely by auditory aphasia (inability to understand spoken language, which is attributed to a brain lesion). Some cases of intermittent word-blindness have also been reported. Hinshelwood ³ says that true congenital word-blindness is marked not only by extraordinary difficulty in learning to read, but also by a lack of any other symptom of cerebral defect.

Pathology of congenital word-blindness. Hinshelwood's observations of a case of alexia accompanied by hemianopsia, with the careful study of the brain by an anatomist and pathologist, lead him to the opinion that word-blindness is

¹ In 1872, William Broadbent reported the condition as complicated with speech disturbances.

² Usually monosyllables are sufficiently legible to be recognized, but longer words do not resemble the intended words. In more rare cases the subject cannot form letters and makes meaningless strokes, sometimes resembling stenographic or runic characters.

³ Hinshelwood, J. *Congenital Word-Blindness*. Lewis and Company, London, 1917.

due to "a lesion in the left supra-marginal and angular gyri in which are deposited the visual memories of words and letters."

Two educational psychologists¹ who made extensive studies of disabilities in reading, found nothing pathological in the way of general defects or shortcomings which might be at the basis of the word-blind condition. Their conclusion, however, was not based upon brain examinations.

Despite the fact that several cases of word-blindness have been reported in which lesions in the cerebral area of the visual memory center for words and letters were not found, Hinshelwood's explanation has been accepted by the majority of those who later reported cases of both congenital and acquired word-blindness. No other explanation has been offered.

Etiology of word-blindness. Clinical and pathological findings from cases of aphasia support the theory of brain localization to the extent that various acquired forms point to more or less isolated defects of vision, audition, and motor response, which are involved in speech. The physiologist Howell says that, "Each part is a distinct center, but their combined use in intellectual life would imply that they are connected by association fibers, so that a lesion may affect only one of these various centers, ... although fundamentally distinct they are practically combined in activity." On the basis of this general point of view, Lord,² after making a detailed study of a word-blind boy, concluded that the con-

¹ Gates, A. I. *The Psychology of Reading and Spelling, with Special Reference to Disability*. Teachers College Contributions to Education, no. 129. Columbia University, 1922.

Schmitt, C. "Developmental Alexia; Congenital Word Blindness, or Inability to Learn to Read"; in *Elementary School Journal*, vol. 18, no. 9 (May, 1918), and vol. 18, no. 9 (June, 1918).

² Lord, Elizabeth E., and others. *Special Disabilities in Learning to Read and Write*. Studies in Educational Psychology and Educational Measurement, Series I, vol. 2, no. 1. Harvard University, 1925.

dition "is not a pathological condition of visual-memory center for words and letters, but is due to a defect in the association fibers; to insufficient associations between the sense areas, and to a lack of coördination in the motor response to visual and auditory stimuli."

One psychologist¹ who made a study of the causes of backwardness in reading gives a convenient classification. He divides the causes of backwardness in reading into the *extrinsic*, ill health, irregular attendance, illiterate homes, and the like, and the *intrinsic*, which latter are either *temperamental* (or moral) lack of industry, interest, motive, and so forth, or *intellectual*. The intellectual factors he considers either *general*, "but one of many symptoms of all pervasive backwardness," or *specific* "affecting the linguistic subjects alone, or it may be even reading alone." Special disability is recognized "when . . . a child is definitely backward in some linguistic subject — backward in that subject by at least thirty per cent of his age, and in that subject twice as backward as in any other school subject or in general intelligence."²

The commonest defects, this investigator continues, seem to be: (1) "failure to discriminate between similar visual forms, especially symbols differing chiefly in the order, orientation, or internal arrangement of their component parts; (2) failure to remember a series of sounds in their due order; (3) failure to associate visible symbol and audible sound in the absence of any comprehensible connection."

In analyzing specific reading defects it must first be ascertained whether there are any defective sensations, such as partial deafness or imperfect vision. When this source of possible backwardness is eliminated, the detection of defec-

¹ Burt, C. *Mental and Scholastic Tests*. London Council. P. S. King and Son, London, 1924.

² Burt, C., *op. cit.*, p. 284, footnotes.

tive perception, in which "the imperfect analysis of forms seen or sounds heard, of words uttered by his own lips or of movements traced by his own hand," or of insufficient memory for the "forms, sounds, and movement feelings fully sensed and distinctly perceived," naturally follows. There are many forms of difficulty in memory, the most common of which is to "perserve for long periods the arbitrary associations between the several abstract symbols, or between the abstract symbols and the concrete meaning."

Case studies. Woolley and Ferris¹ have described an extremely interesting case of word-blindness in which they attributed the deficiency primarily to the subject's immediate auditory memory, and the failure to form associations between the visual symbols and the sounds. The subject also showed a slight auditory defect which was insufficient to be a serious handicap in the schoolroom, and also a speech defect which was manifested by a sort of inability to get words out. The subject was a boy, with an intelligence quotient of 95 at the beginning of the study. During a period of three and a half years nearly every conceivable method had been tried to teach this child to read. The methods included: (1) those of an oral school, where the methods and materials used with deaf children and speech defectives were applied; (2) the use of a typewriter as "the chief instrument of learning"; and finally, through a transfer to a school for the blind (3) the use of the Braille alphabet. He learned the Braille alphabet with normal speed, and "was able to write simple sentences in Braille without error." Under the guidance of this last method this child was able to make his first start in learning to read, perhaps because of the development of the tactual motor type of

¹ Woolley and Ferris. *Diagnosis and Treatment of Young School Failures*, p. 87. Bureau of Education, Department of Interior, Bulletin no. 1. Washington, D.C., 1923.

image. The investigators suggest the following explanations:

The explanation of the fact that learning Braille gave David his real start in mastering print is by no means obvious. In observing the process, it seemed as though starting to learn to read all over again, with a completely new set of letter symbols, was what turned the trick. The new symbols he succeeded in learning without confusion, and with a real understanding of what he was doing as he went along. The process gave him his first clear conception of what reading meant and he was then able to translate into the old printed symbols, but with great difficulty because the old symbols were already a mass of confusions. It is probable, however, that the explanation goes deeper than this. It may be that the tactual motor type of image necessary in learning the Braille was a type for which it was possible to form normal auditory and motor associations, whereas it was not possible starting with visual images. The pathways in his association tracks leading to auditory centers may be open for tactual motor cues, but not for visual ones directly. The learning of Braille may have given him control of a new type of word and letter image, into which he is learning to translate the visual perceptions before they become cues for speech or writing (page 94).

In this case, as well as in cases studied by others,¹ difficulties in the auditory as well as in the visual perceptions and memories are recognized. Fildes's experimental study with a group of subjects who showed special difficulties in learning to read concluded that her subjects failed mostly on tests requiring auditory repetition. Moreover she found nothing in her experiments "to indicate the existence of any such region as a 'visual-word' center, the absence or injury to which will make the visual recognition of words impossible." She concluded that the defects found are not so strictly localized as such an hypothesis would demand, for the word-blind individuals reveal *special* difficulties in dealing with material other than words. She suggests that her experi-

¹ Namely, Bronner, Burt, and Fildes. See bibliography.

ments show that word-blindness "is but one aspect of a more general, yet still in itself specific, defect in either the *visual* or the *auditory regions*, or *both*," since all the non-readers examined "showed a reduction of the normal power in dealing with forms visually presented, especially when these forms were very like each other, their defect being shown most definitely in their failure to remember such forms."

That the non-reader's special difficulties are due to initial deficiencies in the auditory, visual, or kinæsthetic perceptions and memories has been challenged by other investigators, especially by Wallin, Schmitt, and Gates. (See Bibliography.)

Wallin, experimenting with a matched group of word-blind children and readers, as did Fildes, reached the following conclusions:

It appears, therefore, that the word-blind subjects instead of being inferior are rather superior to the subjects in the subnormal group of the same intelligence age in logical memory, as measured by the immediate reproduction of a read passage... in concrete visual memory as determined by the memorizing and immediate reproduction of drawings, in concrete visual imagination, as determined by the ability to comprehend or imagine the ball-and-field problem, and in immediate auditory memory span, as measured by the recall of digits. In other words, the tests do not reveal any peculiar defects in auditory or visual imagery apart from possible defect in visual word imagery (page 94).

Schmitt says that the "difficulty in every case consisted in the inability to learn phonics — to associate the sound of the letters with the letters themselves," and that the difficulty is central and not sensory in origin. She emphasizes the fact that for the word-blind extra devices for enriching the stock of associations when teaching phonetics are required to establish the associations between the sight of the word or its component parts and their sounds. The ordinary child,

she points out, does not require these extra devices, but the exceptional child has his mind "set" in certain respects — to a certain extent it is a closed system. The difficulties of the "set" mind are compared with the difficulty with which inefficient motor habits acquired in golf, typewriting, and the like, are reconstructed.

Incidence of word-blindness. According to Sydney Stephenson, only fourteen cases of word-blindness had been reported by six writers up to 1904. Hinshelwood, who has made the greatest contributions to the knowledge of word-blindness, encountered thirty-one cases in fifteen years. Wallin found the incidence of word-blindness among the 2116 school cases examined during a course of time, namely 4.48 per cent, to be greater than the combined incidence of epileptics, psychopaths, Mongols, and cretins. The large majority of these children, he tells us, were examined primarily because they were thought to be mentally defective. In some instances a condition of word-blindness caused the semblance of mental retardation. Many complications pertinent to clinical reference prevented Wallin from making any estimate of the ratio of word-blindness among all the elementary-school children in the St. Louis schools, and no accurate figures are available from other school systems.

An estimation that there is one word-blind case for every 2000 boys in the London schools was made by C. J. Thomas. Warburg reported fourteen cases among 2000 ordinary pupils in Cologne, and seven among special-school children.

If milder cases are included, the incidence of word-blindness is greater than has been thought to be the case. However, Wallin is convinced that "only a small proportion of children who have special difficulty in learning to read are word-blind. The proof of this is that many non-readers who were thought to be word-blind have responded to skilled, differential instruction, as shown by Clara Schmitt,

F. N. Freeman, W. S. Gray, G. M. Fernald, and others. There are, however, non-readers who remain practically unteachable by any method. We restrict the term visual aphasia to these cases. Of the cases we have studied, the milder form, dyslexia (3.6 per cent of all examinees, or 82.1 per cent of the word-blind) is about five times as prevalent as the more serious form, visual aphasia (.7 per cent of all, or 17.8 per cent of the word-blind."¹

As long as specialists are not agreed as to what degree of reading difficulty should be classed as word-blindness, it will be impossible to determine the frequency of this condition. Wallin holds that word-blindness is not an absolute condition:

The differences found in word-blindness are like the differences found in general intelligence, they are differences in degree and not in kind. Intelligence varies from profound idiocy to genius, there are many grades or groups between these extremes, but no sharp lines of demarcation can be discovered between the groups. Word-blindness, similarly, varies continuously from a state of profound visual aphasia to a slight degree of dyslexia. Eventually it may be possible to distinguish more groups of this disability than has yet been done, but there will be no gaps between the groups, and the nature of the fundamental reading disability will probably be the same whether or not the symptoms are "pure." Fundamentally the differences between the groups will be quantitative, and not qualitative (page 160).

Word-blindness and sex. In a study of 95 clinic cases of word-blindness in the St. Louis Psycho-Educational clinic, Wallin found the distribution of cases between boys and girls shown in Table XXXVIII.

Thus word-blindness is apparently to some extent a sex-limited disability. In the group of cases studied it was found to be about four times as prevalent among the boys as among

¹ Wallin, J. E. W. *Studies of Mental Defects and Handicaps*, p. 156. 1925.

the girls. Since Wallin's group is the largest group of congenitally word-blind cases ever presented in literature, his findings are especially significant.

TABLE XXXVIII. SEX RATIO OF 95 CASES OF WORD-BLINDNESS
(Wallin)

	Boys		Girls	
	Num- ber	Per cent	Num- ber	Per cent
Dyslexia (applied to more severe degrees)...	71	4.72	7	1.14
Visual aphasia (applied to lighter degrees)...	15	.99	2	.32
Total.....	86	5.71	9	1.46

No explanation for the preponderance of this defect among boys is made. Wallin mentions that it has been suggested that visual aphasia is more prevalent than auditory aphasia, because the reading and understanding of written words was acquired much later in the history of the race than the hearing and interpretation of spoken words. Since historically boys have, perhaps, been taught reading longer than girls, Wallin says that it is a bit more difficult to explain the existing condition. It is possible that factors similar to those causing a greater frequency of speech defects among boys than girls may operate in regard to word-blindness.

Word-blindness and intelligence. In regard to the condition of word aphasia it has been claimed (Adolph Meyer) that the condition is merely one of the intellectual disorders involving language, and that it is accompanied by a lowering of the level of general intelligence (Wundt, Pierre Marie). However, many children afflicted with word-blindness have been reported to be normal in intelligence and even precocious (Hinshelwood), but in practically all these reported cases the children's intelligence was estimated on the basis of school reports or on general impressions of intelligence, and not on standardized tests. Wallin's findings of distribution

of intelligence quotients for 95 cases, based on standardized intelligence tests (specific forms used not stated) is given in Table XXXIX.

TABLE XXXIX. DISTRIBUTION OF INTELLIGENCE QUOTIENTS OF 95 CASES OF WORD-BLINDNESS ¹

I.Q.	Boys	Girls	Both
54 and 57.....	2	..	2
61 and 65.....	2	..	2
66-69.....	6	..	6
70-74.....	10	1	11
75-79.....	23	3	26
80-84.....	18	2	20
85-89.....	13	..	13
90-94.....	6	1	7
95-99.....	4	1	5
101-104.....	2	1	3

The table shows that the intelligence quotients of this group ranged from 54 to 104. Ten, or 10.5 per cent had an I.Q. below 70; 37, or 38.9 per cent between 70 and 79; 33, or 34.7 per cent between 80 and 89; and 15, or 15.7 per cent between 90 and 104. Twelve and six tenths per cent were diagnosed as normal or almost normal (retarded) in intelligence, and 85 per cent as subnormal.

A classification of the same 95 cases on the basis of intelligence is given in Table XL.

Although at least 85 per cent of these were subnormal in general intelligence, the investigator does not conclude that the percentage of subnormality would be equally high in an unselected group of word-blind children. The clinic cases forming the basis of the study were selected because they were thought to be mentally defective, or because they ranked among the most deficient pupils in school in general intelligence, the investigator tells us. Had a selection of all the pupils in the school who were conspicuously deficient in

¹ Wallin, op. cit., p. 159.

reading been made, it is possible that the ratio of those having normal intelligence might have been considerably higher. At any rate, he concludes, the statement that there is a lowering of the general intelligence in word-blind cases cannot be sweepingly applied to all cases.

TABLE XL. INTELLIGENCE DIAGNOSIS OF 95 WORD-BLIND CASES

(Wallin)

	Boys		Girls		Both	
	Num-ber	Per cent	Num-ber	Per cent	Num-ber	Per cent
Normal.....	4	4.6	1	11.1	5	5.2
Retarded.....	5	5.8	2	22.2	7	7.3
Backward.....	34	39.4	3	33.3	37	38.8
Borderline.....	32	37.1	2	22.2	34	35.7
Potential feeble-minded.....	5	5.8	..	....	5	5.2
Total borderline and potential feeble-minded....	37	42.9	2	22.2	39	40.9
Diagnosis deferred.....	1	1.1	1	11.1	2	2.1
Morons.....	4	1.1	..	....	4	4.2
Potential morons.....	1	4.6	..	....	1	1.0
Morons and potential morons.....	5	5.8	..	....	5	5.2

General visual perception of the word-blind. Gates¹ directed an investigation toward the problem of the relation of general visual perception and reading disability. His findings lead him to think that "poor reading is not generally due to defective powers of general visual perception." His findings lead him to question the existence of any general perceptual ability. There is an indication that there are specialized abilities to perceive certain classes of items, such as words, digits, geometrical figures. Poor readers, he finds, who make low scores in tests of word recognition, picking out correctly spelled words, and so on, do as well as good readers in similar functions when materials other than

¹ Gates, A. I. *The Psychology of Reading and Spelling, with Special Reference to Disability*. Teachers College Contributions to Education, no. 129. Columbia University, 1922.

words (drawing and digits) are used. He explains this condition by saying "that some learners develop habits of word perception which are favorable to reading, whereas others, for reasons not yet discovered, do not."

Gates's findings were derived from a study made by the methods of correlation. He tested 135 children in Grades III to VIII in a private school, with some other cases from outside the school. About twenty-five of the cases were reported as having serious difficulty in learning to read. He distributed his subjects into six groups, hence the correlations are based on a small number of cases, and show great variability. In the Table XLI Gates gives the means,

TABLE XLI. CORRELATIONS BETWEEN TEN TESTS OF PERCEPTION WITH A COMPOSITE TEST OF READING ABILITY

(Gates)

Test	Average	M.D.	Range
1 Small differences between pairs of drawings.....	.05	.12	-.10 to +.32
2 Small differences between pairs of groups of digits.....	.14	.07	+.02 to +.26
3 Small differences between pairs of nonsense syllables.....	.27	.09	+.13 to +.55
4 Small differences between pairs of words.....	.39	.08	+.20 to +.60
5 Distinguishing between drawings of squares, circles, crosses, and stars.....	.16	.14	-.14 to .42
6 Distinguishing capital A's from other letters.....	.14	.07	-.02 to .26
7 Distinguishing groups of letters with K and I from other letters.....	.04	.06	-.04 to +.10
8 Distinguishing groups of six digits with 2 and 3 in them.....	.11	.11	-.08 to -.23
9 Distinguishing correct words from incorrect words.....	.47	.11	.22 to .74
10 Detecting incorrect words in "Proof".....	.45	.13	.33 to .73

the mean deviations, and the range of the correlations between the separate tests of visual perception and a composite test of reading.

Eight of Gates's tests were composed of letters, words, and

digits, and only two — namely, detecting small differences between pairs of drawings (of objects, and geometrical figures) and a test for distinguishing between squares, circles, crosses and stars were forms. Another investigator (Fildes) also found that her non-reading subjects had no difficulty in such tests, but only in a finely graded series where forms became more and more alike. This investigator interpreted her findings as indicating that word-blindness “is but one aspect of a more general, yet still in itself specific defect in either the visual or auditory regions, or both.”

Training of the word-blind.¹ Hinshelwood believes that with patience and perseverance the word-blind can be taught to read, but he questions whether a satisfactory result can be attained by any system whatever, where other cerebral centers are involved. No uniform method, he states, can be laid down, but he says that the following general points should be included in devising a remedial method:

1. The child must have personal instruction and be taught alone.
2. A number of short reading lessons, which must be carefully graduated in each case, should be given every day.
3. Visual impressions must be frequently repeated before they remain permanently in the brain.
4. The old-fashioned method (learning the alphabet, then spelling the words) seems superior to the “look and say” method.

Hinshelwood considers the old-fashioned “alphabet” method of teaching reading by spelling as supporting the contention that the difficulty in word-blindness is localized in the visual memory for words. The alphabet method consists, he believes, in first storing up in the visual center the

¹ Elizabeth Lord gives a detailed account of an extensive examination, study, and training of a word-blind child. Her trial and rejection of various methods are related, as well as a detailed account of the method found to be successful. See Lord, Carmichael, and Dearborn, *op. cit.*, pp. 6-33.

visual memories of the individual letters of the alphabet, and in the auditory center the spelling of the words. The word-blind child, he says,

is now able to read words by spelling them out letter by letter, and thus by appealing to his auditory memory, he gets the proper word, or sometimes he may simply be seen to move his lips, spelling silently each letter, and thus appealing to his memory of speech movements, or glosso-kinæsthetic memory, as it has been called by Bastian, or he may sometimes be seen tracing the letters with his fingers on the table and thus appealing to his writing center.¹

The final stage is the "storage of the visual memories of words." This, he believes, is accomplished by the "education of the corresponding center in the opposite side of the brain."

Dr. Schmitt used the phonetic method, but utilized extra devices to enrich the stock of associations between the sounds of the letters and words, and the muscular sensations resulting from their articulation. These associations are supposed to be established by the ordinary phonetic method, but, this investigator claims, the method is not ordinarily carried out with sufficient detail and persistence to meet the needs of the exceptional child. To establish the associations between the sight of the words or its component parts and their sounds, other supporting associations must be introduced for the benefit of the exceptional child. In illustration she shows that *r-r-r* is the growl of the dog Spot, *h-h-h* is the panting sound when Spot is tired and wants a drink, and so on. Then, if later the sight of *h* does not arouse the appropriate sound, the child may be reminded that "that is the tired sound."

In the case of the child whose first start in mastering reading followed the learning of Braille, the experimenters, Woolley and Ferris, explained that "the tactual motor type

¹ Hinshelwood, *op. cit.*, p. 54.

of image... was a type for which it was possible to form normal auditory and motor associations, whereas it was not possible starting with visual images." Since the old visual symbols were already a mass of confusion, this tactual motor approach was especially desirable. Thomas also had success with the word-blind by requiring the tracing of the letters with the finger, "thus utilizing one form of kinæsthetic imagery." "It is probable," he says, "that the earliest memory of letters is a muscular one," and gives the case of a word-blind boy who could not get the meaning of a word until he had written it. Fernald and Keller also achieved success in the training of non-readers by stressing the tracing, writing, and at the same time pronouncing of words.

Gates, despite Hinshelwood's discrediting the "look and say" method, succeeded with all but one of his cases by special training in the visual perception of words. Freeman, in training a child with whom phonetic drill had already been carried to excess, "dropped drills in pronunciation and word building... and tried to develop direct associations between the sight of words and their meaning." Miss Lord, in making a detailed study of a case, found that "somewhat better results were obtained by appealing in the normal way to the visual memory than to either auditory or kinæsthetic memory."

Hollingworth,¹ in reviewing the various methods which have been employed successfully in overcoming word-blindness, suggests that intensive training, no matter what avenue of approach is stressed, will prove successful with children of adequate general intelligence and of normal sensory capacity. That the non-readers encountered by Schmitt in Chicago should have a disability approachable by phonics, and by phonics only; that all non-readers found

¹ See Hollingworth, Leta S. *Special Talents and Defects*, pp. 89-90. The Macmillan Company, 1923.

by Fernald and Keller in California should be so constituted that they could be taught through motor exercises, and through motor exercises only; and that those discovered by Gates in the Scarborough School should be teachable through visual methods, and through visual methods only — does not seem reasonable. No investigator, Hollingworth points out, has established a method, successful in particular cases, by excluding other methods through experimental teaching.

Dearborn¹ in interpreting the various methods used with the word-blind, says that:

When there is difficulty in forming associations between the sight of words, their sounds, the kinæsthetic feelings of their articulation and the meaning already attached to these latter processes, the word wholes, as thus perceived (that is visually, auditorily, and kinæsthetically) must be divided into smaller units and meaning first attached to these smaller units, as is done in the phonetic methods. A certain amount of this analysis is always needed, as probably no one forms, without it, direct associations between more than a very limited number of visual symbols and their established meanings.... Whichever method appears to be stressed it does not ordinarily, except perhaps under rigid experimental technique, exclude the other factors, and its success may be simply due to the fact that it provides a means for establishing more associations or a firmer network of associations between words and their meanings.

2. *Special reading disability: a mild form of word-blindness*

Nature of special reading disability. That children with normal intelligence who have a specific reading disability do exist has been recognized for over thirty years, but the interest in regard to the nature of this handicap has increased in the last few years.

In almost every school there are children who are retarded readers. These children may be of normal or superior intelligence or they may be below normal intelligence. Their

¹ Lord, Carmichael, and Dearborn, *op. cit.*, p. 73.

reading may be retarded because of a variety of errors, such as the non-establishment of correct letter-sounds or the faulty establishment of letter-sounds. The most frequent cause, however, for reading retardation is a reversal of letters, letter combinations, and of entire words. The frequency of occurrence of these characteristic alternations and confusions resulting from them bears a significant relationship, not only to the severity of reading-retardation, but also to the degree of the handicap.

During the early years the child having a special reading disability experiences greater difficulty than the average in distinguishing *b* from *d*, and *p* from *q*. Later the child is able to distinguish these letters when seen alone, but will continue to alternate them in writing, spelling, and in reading words in which either letter, when combined with the remainder of the letters, will form a word. For example, a child may read *big* for *dig*, *bear* for *dear*, *bust* for *dust*, and so on. In writing from copy *advance* may be written *ab-vance*, *puery* for *query*, *laby* for *lady*, and so on. Errors in spelling from dictation may be of the same nature but are not quite as numerous. The errors in these cases occur, perhaps, when the child is directed by his faulty visual image of the word. When directed by proper auditory imagery, that is, when he pays attention to the sound of the letters of the word, these errors are not apt to occur. A reversal of numerals is also common. When the correctly formed numerals are shown to the child, together with his faultily formed ones, he often fails to see a difference.

These simpler confusions between letter forms are corrected later, but errors due to wrong sequence or direction of reading are common. Pallidromic words, like *was* and *saw*, *not* and *ton*, *rat* and *tar*, *tip* and *pit*, are most frequently confused. Very often a few letters are reversed within a word. Thus, *board* is read as *broad*, *place* for *palace*, *comprae* for

compare, from for form, and so forth. Obviously, a failure of the printed word to call up its sounds in proper sequence forms an obstacle in the arousal of the auditory memory of the word to which its meaning is attached and greatly impedes reading.

At still later stages, in the milder cases and especially in those children who had a great deal of intensive and special help, there is a fair facility in reading accustomed words so that reading-test ratings comparable to the children's school placements are attained. However, there usually is an almost complete failure when new words are encountered. Orton¹ cites the case of a thirteen-year-old girl who read *architectural* without hesitation, but was unable to read *archæological*, although she knew the word by ear and read *logical* instantly when the first half of the word was covered, and then read the whole word with ease. The advance in grade made by this child was due to extra work, for her schooling failed to give her the reading-tools that make fluency possible and that would permit her to increase her reading-vocabulary outside of school drill. The effect of slow and insecure reading on all academic subjects is obvious. Orton also cites the case of a child who said, "I can do my arithmetic if I understand the problem, and I can understand it if the teacher reads it to me, but it's a lot harder if I have to read it myself."

Neurological explanation of special reading disability. Orton,² in giving a neurological explanation of this type of reading disability, points out that while there is no structural difference between the two hemispheres of the brain, there is a striking difference between their functional duties. The

¹ Orton, S. T. "An Impediment to Learning to Read — A Neurological Explanation of the Reading Disability"; in *School and Society*, vol. 28, pp. 286-89. (September 10, 1928.)

² Orton, *op. cit.*

two halves are about equal in size and in complexity, and the nerve cells of both halves are influenced by the stimuli which they receive. The assumption is made that the inactive (or non-dominant) hemisphere is stimulated as freely as the active (or dominant) side, and that such stimulation leaves a record behind it in the nerve cells of both hemispheres. That is, both halves are equally irradiated by nerve currents and both bear impress thereof, but since destruction of one side brings no aftermath, it is believed that one of these sets of records is inactive in the language-faculty, and that normally a physiological habit using only one set in reading, writing, and speech, is established. However, the two halves of the brain, while about alike in size and design, are reversed in pattern. The hemispheres of the brain bear the same mirrored relationship to each other that the left hand does to the right. It seems logical, therefore, Orton concludes, that the records (or engrams, as they are called) of one hemisphere would be mirrored copies of those in the other. Then, if there should be a failure to establish the normal physiological habit of using those of one hemisphere exclusively, a confusion in orientation might easily result. This confusion would exhibit itself in the tendency toward an alternate sinistral and dextral direction in reading, and in a lack of prompt recognition of the differences between pairs of words which can be spelled backwards or forwards, such as *was* and *saw*.

Special reading disability in relation to left-handedness and left-eyedness. Dearborn,¹ in studying a group of children who had extreme difficulty in learning to read, noted an association of differences in handedness and eyedness with

¹ Dearborn, W. F. "Special Disability in Learning to Read." An address at the Eleventh Annual Conference on Educational Measurements, held at Indiana University, April, 1924. Published by the School of Education of Indiana University, in 1925. See summary of this address in *School and Society*, vol. 21, no. 802. (May 10, 1930.)

these reading difficulties. The most frequently observed errors in Dearborn's cases were the reversals of the forms of individual letters, as in reading *dig* for *big*, and in reversing the order or sequence of letters as in reading *saw* for *was*, *no* for *on*, *tog* for *got*, *place* for *palace*. A tendency to attack words from the wrong end was noted when the children made tachistoscopic readings, and photographic records of the child's eye-movements showed similar tendencies in some instances. Complete or partial mirror writing was also present in some of the cases.

Dearborn considered these mistakes to be due to the interference of sinistral tendencies of hand and eye with the learning of the dextral movements and sequences required in our reading and writing. In our language a sequence from left to right has to be followed in order to build up correct visual and kinæsthetic images of words. In the right-handed individual, the eye-movement from the center of the body outward is the natural and the easiest movement. The natural and the easiest movement of the left-handed child results in the sinistral movement, a right to left movement. In learning to read, the left-handed children confuse *b* and *d*, or reverse the sequence of letters, as in reading *god* for *dog*, because they are using their natural and easiest eye-movements. These children often have difficulty in learning to write, some often writing mirror-wise, and many seem to "push" the pencil. The reversal of forms and letters in reading may be just as frequent as in writing, but they are more obvious in writing and hence receive greater attention.

Dearborn found, in cases where lateral dominance was not established, a more serious and subtle, and less readily detected difficulty. An uncertainty in regard to the correct sequence of letters in the word accompanied the conflicting tendencies of hand and eye. Faulty word images with letters interchanged had been stored up in the mind; these

images later interfered with prompt and precise recognition of words. Instances in which an incorrect order of vowel and consonant sounds was established were thought to result in stuttering. Among the characteristic misreadings in the cases of non-established lateral dominance, the following were common: *soft* for *spot*, *licks* for *likes*, *cool* for *cold*, *migit* for *might*, *broad* for *board*, *framing* for *farming*, *scratching* for *scarcely*, *victoral* for *victrola*, *signature* for *structure*, and so on.

Dearborn cites an interesting case of this special type of reading disability and in which, as a compensation, a special ability originated. An exceptionally fine boy, with artistic interests, very much liked by his schoolmates and teachers, was found to be curiously dull in his books in comparison with his social intelligence. His rating on the Stanford-Binet Intelligence Scale was found to be 102 — far below the general impression he made. In examining this subject, Dearborn noted four significant factors:

1. In tachistoscopic reading the boy had a narrow visual span, and his recognition of words was uncertain. For *in a shay* he read *on their way*, thus indicating that his visual images or memories of word-forms were vague and ill-defined.
2. In spelling from dictation the same deficiency was apparent, and in consequence the child attempted to compensate for it by trying to spell phonetically. Thus, he spelled *pleage* for *pledge*, *dangeous* for *dangerous*, *chone* for *shown*, *secratery* for *secretary*, *colified* for *qualified*, *finachial* for *financial*, *cusoonary* for *customary*, *notorichy* for *notoriously*, *evishent* for *efficient*, *fatige* for *fatigue*, *pietyable* for *pitiable*, *distrot* for *distraught*.
3. In reading a passage of rather long and difficult words, he became confused and stuttered somewhat.
4. The subject was found to be left-eyed, and that, although he wrote with his right hand, he used his left hand for some acts of skill. He dealt cards with his left hand, and in tests in which he was not practiced he used either his left hand or showed tendencies toward "ambidexterity."

This subject's scholastic difficulties and his low intelligence rating were attributed to non-established lateral dominance. His high artistic skills and interests were interpreted to be the direct outcome of an able and intelligent mind making efforts to establish competence in other directions.

Dearborn found that "compensations" in the case of boys usually followed mechanical lines. In fact he encountered unusual skills in these directions so frequently that in establishing a diagnosis he was apt to inquire whether the boy were mechanically inclined.

Remedial procedure. Orton points out that these children usually have a much better auditory than visual memory, and in earlier psychological literature they were referred to as children with predominant auditory-imagery as opposed to the children having predominant visual-imagery. Such a characterization, he added, is merely superficially descriptive, and its use must be discouraged because of the implication of an inherent constitution unresponsive to remedial procedure, and the possible suggestion to use the more facile path for training rather than to correct a weaker one.

The nature of the errors which children make in tests of reading will serve to determine whether a tendency to alternate sinistral and dextral eye-movements is an impediment in reading. It will also indicate the severity of the disability and will give clues to special methods in retraining. Orton says:

The test of such an hypothesis lies largely in its application and a fair number of retraining experiments have now been carried out to the point where I think we can say with fair security that this disability can be very largely overcome when it is recognized at an early period and proper training measures are immediately instituted and consistently carried out. Such retraining, for example, resulted in a full year's advance in reading after eight weeks of spe-

cial work in a group of children who had fallen behind on an average of over two years in reading while in the regular schools. The giving of an adequate skill in reading to the older cases is still in an experimental stage. I am undertaking the direction of a training program in two such cases, but too recently to estimate the results which may accrue.

Specific methods that have been found to be satisfactory in correcting this type of special reading disability are not described in the literature of the subject, hence the teacher must devise methods of her own. It may be that in the case of beginners who show tendencies toward sinistral reading habits, learning to read by the alphabet method rather than the word method, may be practical. The building up of words from letters may help to establish dextral reading habits. In learning to read by the word method children may learn to recognize words by sinistral eye-movements and still make progress for some time. Not until longer sentences or the compounding of words is begun may the faulty movements give difficulty.

CASE STUDY: A WORD-BLIND CHILD

The case. Jack is the youngest of six children. He entered a rural school at five, and for a short time was very happy. He was anxious to go to school and to attend regularly. Forty children were enrolled in the one-room school, but the teacher spent a great deal of time with the beginners. Jack's brothers and sisters and mother helped him at home, but at the end of the year Jack was not able to recognize a single letter-sound, while the other children in the beginners class were ready to proceed with the second-year's work. Jack was very unhappy about his failure. The parents thought that in all probability Jack had been too young to go to school and should have waited until he was six.

The following year a young, well-trained, but inexperienced teacher was engaged to teach Jack's school. She was energetic and tireless in her efforts to teach Jack, but by the end of the year Jack was still unable to read. His progress in oral number work and nature study was satisfactory. He was able to memorize and

reasoned well for his age. The parents blamed Jack's failure in learning to read to his teacher's youth and inexperience, and were pleased when the following year a veteran teacher was elected to teach the school. Jack's parents told her about her two predecessors' failure to teach Jack to read. The teacher assured the parents that Jack would be reading within a few weeks; during her fifteen years of teaching experience this teacher had never failed to teach a child to read. She began her task with a great deal of confidence. Months passed, however, and still Jack could not read. By the end of the year this experienced teacher admitted her first failure, but was anxious to try again. She had succeeded in keeping Jack happy in school and in teaching him other things than reading. She was convinced that Jack was mentally normal, and that there must be some way of teaching the child. The teacher was planning to attend summer school during the coming summer, and she decided to find out all she could about Jack's case. At summer school, however, little help could be given her (this was before the time of the special investigations of word-blindness). The best advice she could obtain was that perhaps tried methods were not adaptable to Jack's case, and that she should accumulate as many methods of teaching beginners to read as possible and try out one after another.

Upon returning to Jack's community this teacher asked to board at Jack's home so that she could work with Jack out of school hours, since the large school enrollment prevented her from giving the time to Jack's case that she wished to give. The parents, now alarmed about Jack's condition, gladly consented to this plan. In outlining her plans for Jack's training the following year this teacher stressed the alphabet method, and *taught Jack to read a few German and a few French words*. Three years of failure-associations with the English words were considered to be a block to further use of these words. Careful search through the college's limited library failed to disclose radically different methods from those already tried with Jack, hence this teacher decided to use some German and some French words to infuse freshness into her work. It was for this purpose that she asked to board with Jack's parents, for she did not wish to try her experiment before her school. In school she kept Jack busy and happy with seat work, when he was not listening to class work. Jack was required to spend a great deal of time in classes with older children, to get material through his ears that he could not get by reading. By the end of that year, the teacher's

patience and tireless energy were rewarded by Jack's learning to read.

Queries. In view of your knowledge of word-blindness, what part of this procedure do you think was responsible for success? What method of procedure would you advocate in the case of a word-blind child, in a rural school having an enrollment of about forty children ranging from the first to the eighth grade; many classes in such schools formerly were (and may still be) only two or three minutes long?

SELECTED REFERENCES

1. Bronner, Augusta. *Psychology of Special Abilities and Disabilities*. Little, Brown and Company, Boston, 1917.
2. Burt, C. *Mental and Scholastic Tests*. London Council. P. S. King and Sons, London, 1924.
3. "The Unstable Child"; in *Child Study*, vol. 10, no. 3. (October, 1917.)
4. Fernald, G. M., and Keller, H. "The Effect of Kinæsthetic Factors in the Development of Word Recognition in the Case of Non-Readers"; in *Journal of Educational Research*, 1921.
5. Fildes, L. G. "A Psychological Inquiry into the Nature of the Condition Known as Congenital Word Blindness"; in *Brain*, vol. 44. (1921.)
6. Freeman, F. N. "Clinical Study as a Method in Experimental Education"; in *Journal of Applied Psychology*, 1920.
7. Gates, A. I. *The Psychology of Reading and Spelling, with Special Reference to Disability*. Teachers College Contributions to Education, no. 129. Columbia University, 1922.
8. Gray, W. S. *Remedial Cases in Reading: Their Diagnosis and Treatment*, Supplementary Educational Monographs, no. 22, June, 1922. University of Chicago Press.
9. Hinshelwood, J. *Congenital Word-Blindness*. Lewis and Company, London, 1917.
10. Hollingworth, L. *Special Talents and Defects*. The Macmillan Company, New York, 1923.
11. Morgan, W. P. "Congenital Word Blindness"; in *British Medical Journal*, 1896.
12. Schmitt, C. "Developmental Alexia; Congenital Word Blindness, or Inability to Learn to Read"; in *Elementary School Journal*, vol. 18, no. 9 (May, 1918), and vol. 18, no. 9 (June, 1918).

13. Wallin, J. E. W. "Congenital Word Blindness, Some Analyses of Cases"; in *The Training School Bulletin*, vol. 71.
14. Wallin, J. E. W. *Studies of Mental Defects and Handicaps*, 1925. No publisher given. The book is comprised of reprints of his studies that have appeared elsewhere.
15. Woolley and Ferris. *Diagnosis and Treatment of Young School Failures*. Bureau of Education, Department of Interior, Bulletin no. 1. Washington, D.C., 1923.

CHAPTER XV

THE DELINQUENT CHILD

... a heithen writer, *Isocrates*, doth leaue in memorie of writing, concerning the care, that the noble Citie of *Athens* had, to bring vp their yougthe, in honest companie, and vertuous discipline, whose taulke in Greke, is, to this effect, in Englishe.

"The Citie, was more carefull, to see their Children well taughte, than to see their yong men well gouerned: which they brought to passe, not so much by common lawe, as by priuate discipline. For, they had more regard, that their yougthe, by good order shold not offend, than how, by lawe, they might be punished: And if offense were committed, there was, neither waie to hide it, neither hope of pardon for it. Good natures, were not so moche openlie praised as they were secretlie marked, and watchfullie regarded, lest they should lease the goodnes they had....

"*Athens*,¹ by this discipline and good ordering of yougthe, did breede vp, within the circute of that one Citie, within the compas of one hondred yeare, within the memorie of one mans life, so manie notable Capitaines in warre, for worthinesse, wisdom and learning, as be scarce matchable no not in the state of Rome, in the compas of those seauen hondred yeares, whan it flourished moste." ROGER ASCHAM, *The Scholemaster*.

1. *Types of cases and offenses*

IN studying transgressors, delinquents, and malefactors of many varieties, we are met with the greatest difficulties in trying to ascertain our subjects. Crime apparently consists of doing what is forbidden by law. Right and wrong are not absolute concepts. A person who steals a few dollars by non-legal methods is a thief and is punished as such; a person who steals thousands of dollars by legal methods is acclaimed a prosperous individual. In regard to murder, it has been said, editorially, that "The safest kind of murder is whole-sale murder. If you kill one man, you are hanged. If you kill a thousand, you go free. If you kill a hundred thousand, you are a hero."

¹ Ascham gives later on a list bearing out his statement, which can be verified by reference to history.

Likewise, in dealing with our youthful offenders, we often brandish a queer banner of justice from strange heights of righteousness. The young student copies a few words from his classmate and is banished from his school by the professor who steals years of conscientious research work from his students. The expelled student is labeled a cheat; the professor is applauded as a scholar.

Despite such vague moral standards we shall attempt to study the delinquent child.

Definition of delinquency. Juvenile delinquency is a general term comprising various violations of the law that in adults are commonly punished by imprisonment.¹ Among the specific violations commonly encountered are stealing, burglary, property damage, common assault, and indecent assault. Other misdemeanors characteristic of children only include truancy, excessive lying, sexual impropriety, and incorrigibility.

A study of offenses. The offenses of Chicago and St. Louis delinquent children, grouped in a simple classification, are shown in the following table.

TABLE XLII. OFFENSES OF DELINQUENTS IN CHICAGO (1921)
AND IN ST. LOUIS (1919-20) PER HUNDRED
(From Mangold)

Offense	Chicago		St. Louis	
	Boys	Girls	Boys	Girls
Against the person.....	7.2	0.7	2.3	0.0
Against property.....	65.9	11.8	56.6	10.6
Against morals.....	20.9	87.5	17.1	81.0
Against the peace.....	....	....	13.5	6.3
Violating city ordinances..	....	....	10.5	2.0
Other.....	6.0	0.0	0.0	0.0

The leading offenses among the boys are offenses against

¹ See Burt, Cyril. *The Young Delinquent*, pp. 13-15. D. Appleton and Company, 1925.

property. The actual offense in most of these cases we are told is larceny, although a number of boys are guilty of the more serious offenses against property, such as robbery and burglary. The girls commit few offenses against property, and are more inclined to be brought into court on charges of immorality or incorrigibility.

A predominance of stealing among juvenile male delinquents is indicated in the findings of other studies. In comparing offenses of 2000 Chicago delinquents with 2000 Boston delinquents, Healy and Bronner¹ found that stealing ranks first among all offenses of each group of boys and that the percentages varied only slightly, 68 per cent for the Chicago group and 70 per cent for the Boston group. Burglary, major breaking and entering, occurs much less frequently than stealing, but is considered a much more serious offense because it indicates a trend toward professional criminalism. Table XLIII shows Healy and Bronner's findings in regard to types of offenses committed by the total 4000 juvenile delinquents of Chicago and Boston. The study is divided into groups of 1000, two of these groups from Chicago and two from Boston.

In discussing the particular types of offenses, the investigators were thoroughly convinced that the delinquencies of the Boston juvenile offenders were vastly milder in nature than those committed by juvenile delinquents in Chicago. Except for figures for burglary and for robbery with violence, this cannot be shown in bare statistics. They also point out that later careers of the Chicago offenders are often extremely desperate, including the commission of many serious crimes, almost none of which were found in any significant measure by tracing an analogous group of Boston juvenile delinquents.

The significance of some less commonly occurring offenses

¹ Healy, W., and Bronner, Augusta F. *Delinquents and Criminals; Their Making and Unmaking*, p. 166. The Macmillan Company, 1926.

TABLE XLIII. PERCENTAGE DISTRIBUTION OF OFFENSES OF 4000 JUVENILE DELINQUENTS. PRESENTED IN TWO SERIES OF 1000 EACH FROM CHICAGO AND BOSTON

(From Healy and Bronner)

Offenses	Boys				Girls			
	Chicago		Boston		Chicago		Boston	
	I	II	I	II	I	II	I	II
Offenses against property:								
Stealing.....	66.	70.	72.	73.	32.	30.	40.	41.
Automobile stealing.....	....	....	2.6	2.4	....	....	....	....
Major breaking and entering (burglary).....	8.	17.	4.	3.3	....	....	....	....
Petty breaking and entering.....	....	....	27.	34.	....	....	....	....
Picking pockets.....	1.5	1.5	1.7	1.1	....	....	....	....
Forgery.....	1.7	2.	.8	1.6	2.	1.5	.4	.3
Arson.....	1.5	....	.4	1.3	1.	....	.4	0.
Offenses against the person:								
Robbery (hold-ups).....	1.5	4.	0.	0.	....	....	....	....
Assault and battery or fighting with weapons.....	6.	....	.5	0.	.7	....	....	....
Cruelty.....	1.5	....	.5	.7	.3	....	.4	....
Attempted suicide.....	.5	.5	....	.1	3.	3.	.5	1.
Offenses of sex nature:								
Immorality with opposite sex.....	4.5	4.5	4.7	7.1	60.	73.	52.	54.8
Abnormal sex misconduct.....	4.	4.	4.3	3.7	3.	1.5	1.2	1.
Offenses against social regulations:								
Carrying concealed weapons.....	1.5	2.5	.3	1.4	....	....	....	....
Vagrancy.....	2.	5.	1.1	1.3	....	....	....	....
Running away from home.....	39.	48.	48.	24.	25.	37.	40.	32.
Sleeping out nights.....	12.	....	22.	21.4	10.	....	1.6	1.2
Excessive idleness, loafing.....	....	10.	13.	8.1	....	....	....	....
Out late nights.....	....	....	21.	16.7	....	10.	37.	37.5
Truancy.....	32.	43.	43.	41.	7.5	4.	3.	1.6
Excessive lying.....	14.	7.	11.3	6.7	27.	14.	16.5	13.
False accusations.....	1.	.2	0.	0.	5.	9.	....	2.8
Selling without license.....	....	....	2.	3.4	....	....	....	....
Begging.....	1.	....	2.2	2.9	.3	....	0.	.6
Gambling.....	2.	2.	3.	5.1	....	....	....	....
Alcoholic intoxication.....	3.	3.	2.3	.6	3.	3.	0.	0.
Cases — Totals.....	694	692	758	686	306	308	242	314

is interpreted on the basis to which the individual is guilty, and on the motivation of the act. For example, picking pockets may be undertaken with an attitude bespeaking professionalism, or it may be done impulsively in the face of an opportune moment. Forgery is always serious because intent and planfulness are involved. Arson in children is always dangerous, but it does not have the usual motivation

of adult fire-setting; in the case of children it is practically always done either for excitement or in attempted reprisal.

Immorality as an offense. This table, like the one preceding, shows that immorality with the opposite sex is the most frequently encountered offense of the girls. All studies corroborate this serious situation. Excessive lying is an offense complained of more frequently among girls. It is of interest to note that alcoholic intoxication occurs in the Chicago series for girls as frequently as for boys, while no cases are recorded among girls in Boston.

In a study ¹ of 500 delinquent girls, it was found that 371 had been committed for immorality, 50 for incorrigibility, 46 for dependency, 25 for larceny, 4 for truancy, 3 for drunkenness, and 1 for sending obscene matter through the mails.

Were the social evaluations the same for the two sexes, we might well find the same amount of immorality among delinquent boys, at least the older ones, as among girls. The very concept of immorality is a function of social standards in regard to things sexual, and involves mutual delinquency of boys as well as girls. In Healy and Bronner's study of the second series of Chicago delinquents, 73 per cent of the delinquent girls were charged with immorality with opposite sex, while only 4.5 per cent of delinquent boys of the same series were charged with similar offenses. It is difficult to conceive of 68.5 per cent of the delinquent girls as being sexually immoral with perfectly moral boys and moral men.

A study of the various types of offenses of the delinquent child makes us conscious of the fact that here again our exceptional child is not a sporadic individual, radically different, in regard to morals, from other children. Just as the amounts of native intelligence possessed by a large group

¹ Morrow, Louise, and Bridgeman, Olga. "Delinquent Girls Tested by the Binet Scale"; in *Training School Bulletin*, vol. 9, no. 3. (May, 1912.)

of unselected children conform to the normal-distribution curve, so do the amounts of moral traits possessed by any group of children also conform to the curve. At no point in the misdemeanor curve is there a sharp line of cleavage marking off the delinquent from the non-delinquent children. We must arbitrarily determine at which point children shall be considered delinquent, and must remember that many children very nearly approach this arbitrarily established standard who are not considered delinquent. Likewise very many, more fortunately befriended, overstep by a large margin the minimal offenses of the delinquent and still are not classed as delinquent.

2. *Causes of delinquency*

Factor levels. In diagnosing a delinquent we are, naturally, most anxious to determine the cause of his delinquency. For a while feeble-mindedness was considered the potent cause for juvenile offenses. Unfortunate social conditions, bad companions, broken homes, parental alcoholism, and various other factors were in turn ascribed the primary cause for the transgressions of children. At present we recognize an intricacy of causations existing in every individual case, so that it is impossible to select one or a few factors as being specifically responsible for unfortunate demeanor. Healy¹ has diagramed group connections of some simple findings to show their interrelationships in causing delinquency. In Figure 61, he shows three general levels of factors, the delinquent act or the offense, the offender as a member of some general class, and the causal antecedents back of the tendency to delinquency. The connecting lines represent either sequence or conjunction of evidenced elements. The combinations, we are told, are made from only

¹ Healy, William. *The Individual Delinquent*, p. 122. Little, Brown and Company, Boston, 1915.

a few ascertained facts and types, and could be made infinitely more complex by the addition of other facts.

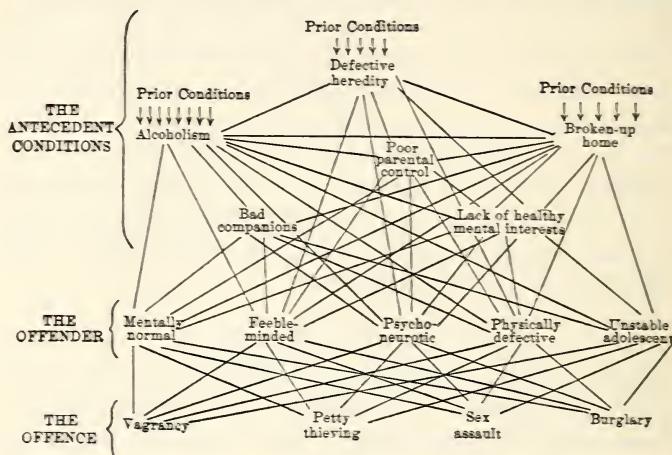


FIG. 61. DIAGRAM OF SEQUENCE OR CONJUNCTION OF SOME SIMPLE ANTECEDENTS AND CONSEQUENTS

(After Healy.)

The diagram shows that classification on any level tells very little of what is of practical importance on other levels. For example, burglary may be committed by any one of the types of offenders who may have been influenced by a number of different antecedents or immediately inciting factors. Thus the same offense committed by different offenders must be dealt with in an entirely different manner. Healy says:

The criminal is not in himself to be grouped according to any logical system, and mere classification of either the antecedent or the consequent of his tendency leads only a short distance along the path of scientific and practical aims. This is the first lesson to be learned from the diagram. The second is, that each nucleus or fact cannot, in any fair-minded way, be interpreted as being or having a

sole antecedent or a sole consequent. The diagram is worth pondering over with this in mind, before spending time on the estimation of the responsibility of alleged main causes, or the values of even partial panaceas.

Delinquency in relation to heredity. A study of family charts spotted with constantly recurring criminalistic or delinquent tendencies tempts one to infer that these tendencies are heritable. However, the whole problem of human conduct is so complicated by environmental factors and physically heritable factors contributing to delinquency that we cannot claim inheritance of specific tendencies to delinquency. We know that many nervous and mental defects are often closely correlated with delinquency, and that these defects are heritable; investigators do not consider the criminalistic tendency itself heritable. Even a study showing a high degree of criminality existing for centuries, as in an outlawed state reported by one investigator,¹ "does not prove the hereditary character of criminality itself. It may equally as well be attributed to the unfortunate force of example, that smothered good impulses before they could be developed." The same investigator reviewed the findings of other authorities² and summarized his investigations on the topic with these words:

This makes it possible to dispense with the hypothesis that criminal tendencies, like artistic talents, for instance, are transmitted from parents to children. I expressly say that we can dispense with it for it cannot be refuted or proved.

Spaulding and Healy³ made a study of one thousand

¹ Aschaffenburg, G. *Crime and Its Repression*, p. 127. English edition, Little, Brown and Company, 1913.

² Notably Hartmann, Kurella, Marro, Monkemoeller, Sighele, Suchart, and Penta.

³ Spaulding, Edith R., and Healy, Wm. "Inheritance as a Factor in Criminality"; in *Bulletin, American Academy of Medicine*, vol. 15, no. 1, pp. 1-24. (February, 1914.)

cases of young repeated offenders without finding conclusive evidence of hereditary criminalistic traits, as such. The method followed in this study was to take the total one thousand cases, and then to eliminate those which showed evidence of no prior criminality in the family; from the remainder, those that showed evidences of epilepsy or mental defects were next eliminated; from the remaining group, further elimination was made of other cases where other factors were in evidence that might explain the criminality. The following table shows the results of this procedure:

Total number of cases.....	1000
Number having sufficient data for evaluation of causal factors.....	668
271 cases had no previous criminality in family, leaving.....	397
245 had evidence of epilepsy or mental defects, leaving.....	152
42 were distinctly psychopathic or neuropathic, leaving.....	110
3 were victims of faulty development factors, leaving.....	107
61 had extremely faulty environment, leaving.....	46
17 had inherited defects plus bad environment, leaving.....	29
2 had bad environment plus faulty development, leaving.....	27
3 showed evidence of peculiar mental characteristics, not hereditary.....	24
9 cases were characterized by complex factors, but outside of criminalistic heredity, leaving.....	15

Thus, by the process of elimination, only fifteen cases remained in which the investigators were free to look for inherited criminalistic traits. In each case other factors were found which were much more pertinent in causing delinquency than inherited criminalism. These factors are given as "peculiar outbursts of temper, hypersexualism as a prevailing trait, premature puberty, lack of general mental and moral energy, excess of energy, and lack of mental and moral inhibitions," each figuring "as the main cause of delinquency in the individual." Some of these traits were found to be due to heredity. Some, the investigators claimed, could, under favorable circumstances, as easily make for genius as in the cases studied they made for delinquency.

Healy gives several case studies of individual delinquents

showing that recurring delinquency in a family may be based upon inherited physical characteristics. One of these case studies shows the inheritance of excess energy resulting from an exceptionally strong constitution, which was the underlying factor of delinquency in both child and parent. A summary of the case is given:¹

Case study. A bright girl of 16 years; guilty of much misbehavior. She stayed away from home on numerous occasions, going to work when and where she pleased, unbeknown to her mother, threatened physical violence, showed extreme temper, and indulged in sex delinquency.

Physically, she was in tremendously good condition; symmetrically developed. Very strong. Weight, 152 pounds. Height, 5 feet, 1 inch. Notable was her mature type of face, with its decidedly good features and firm chin.

Interest in the hereditary aspects of this case was immediately awakened by viewing the mother. She and the daughter were cast from exactly the same mold. This woman of a little more than 40 had given birth to fifteen children, had much trouble on account of poverty, the death of her husband, and other family troubles yet was still enormously strong, healthy, fiery and emphatic. The powerful physiognomy of the girl was inherited straight from this vigorous personage. The mother freely told of beating the daughter, and displayed much temper in recounting the girl's delinquencies. In fact, she stated that on account of certain things her daughter had said about her she really feared she would choke her to death if she got hold of her again.

The girl met the investigators in the same straightforward way as the mother. "I can't see why mother thinks I'm so bad, since she's just like me." She went on to tell that she did what she did just because she wanted to.

Although there were other elements in the case, the background of the trouble was certainly the inheritance of a remarkable physical organization, the substratum of her mental qualities and her delinquency.

An opposite point of view. In opposition to the point of view that there is no evidence in regard to the heredity of

¹ Healy, *op. cit.*, pp. 142-43.

criminalistic traits, we have a formidable array of authorities, such as Thorndike,¹ Davenport,² Rosanoff,³ and Goddard,⁴ who show that there is high inheritability of mental traits. Kelley⁵ holds that, while the actual crimes

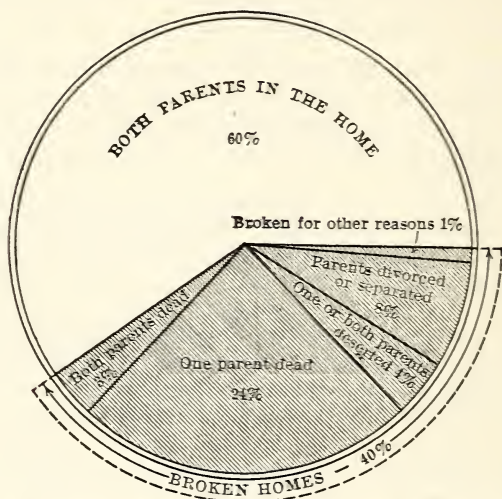


FIG. 62. PARENTAL HOMES OF 10,845 CHILDREN, DEALT WITH BY JUVENILE COURTS IN 7 CITIES (CHICAGO, CLEVELAND, DENVER, KANSAS CITY, LOS ANGELES, MINNEAPOLIS, PHILADELPHIA), DURING ONE YEAR

Forty per cent of these children were from broken homes. (After Lenroot and Lundberg.)

¹ Thorndike, E. L. *Educational Psychology; Briefer Course*, p. 360. Teachers' College, Columbia University, 1914.

² Davenport, C. D. *The Feebly Inhibited*. Carnegie Institution of Washington, 1915. (Considers in detail the inheritance of nomadism.)

³ Rosanoff, A. J., and Orr, Florence L. "A Study of Heredity of Insanity in the Light of the Mendelian Theory." *Eugenics Record Office, Bulletin no. 5*. (Considers that neuropathic constitution is heritable according to the Mendelian principles.)

⁴ Goddard, H. H. *Feeble-mindedness: Its Causes and Consequences*. The Macmillan Company, 1914.

⁵ Kelley, *op. cit.*, p. 57.

committed are determined by environmental opportunities, heredity is the most important factor in supplying the nature that is potentially delinquent.

A large percentage of delinquent children coming from broken homes, or homes from which some element of parental guidance is lacking, is found in all extensive investigations. A government investigation ¹ of ten juvenile courts, involving 10,845 delinquent children, found that 40 per cent came from homes in which death, desertion, divorce, or separation of the parents had disrupted the family. Moreover, the investigators think that:

An analysis of the home conditions in the 60 per cent in which both parents were living in the home would undoubtedly show, as an analysis on a smaller scale has done, that in a large proportion of these cases the waywardness of the children was directly traceable to absence of the mother from the home because of outside employment or to abnormal conditions in the home.

The delinquent as a moral imbecile. The question has often been raised as to whether there are moral imbeciles, that is, persons intact in mental powers, but devoid of moral feelings. Healy, in his studies of a thousand juvenile delinquents, did not find a single case of this kind. Wilde ² gives an example of the intellectual criminal who has been considered the classical "born offender." In summary this case is as follows:

Thomas Wainewright — poet, painter, art critic, and antiquarian — was a forger of wills and the most callous poisoner of modern times. He was born of a "failing and degenerating stock." In late adolescence he was attacked by some morbid "trouble of the nerves" — perhaps an anxiety neurosis. Writing under the pseudonym of *Janus Weathercock*, he developed a style all his own and

¹ Lenroot, Katharine, and Lundberg, Emma O. *Juvenile Courts at Work*, p. 225. Bureau Publication no. 141, United States Department of Labor, 1925.

² Wilde, Oscar. *Intentions; Pen, Pencil, and Poison*, pp. 53-58.

contributed numerous essays to the literature of his day. Oscar Wilde has considered him "the pioneer of modern Asiatic prose," and thinks that "modern journalism owes almost as much to him as to any man of the early part of his century." For a while Wainewright was conspicuous as a dandy, wearing lemon-colored gloves, cameo breastpins, and exquisite onyx rings which were acclaimed by Hazlitt as the colored symbols of a new æsthetic cult. He was among the earliest admirers of Shelley and Keats. Later he became an intimate friend of Charles Lamb. He achieved great fame as a collector of art curios, of Greek gems and Persian carpets, ancient statuettes and modern engravings. To raise money for his collections he forged a power of attorney for several thousand pounds. After a long delay he was tried, convicted, and transported to the felons' settlement, where fifteen years later he died in an apoplectic fit.

When his trial was over, he boasted of his many accomplishments in forgery and poisoning, crimes long suspected but until then unproved. His first victim had been the uncle who had brought him up. The next year he murdered his wife's mother, and somewhat later he poisoned his sister-in-law, Helen, a young woman of some renown as a beauty, and who had been heavily insured against death. He then induced the father of his mistress to insure himself for three thousand pounds. Later as they sat together one evening after dinner, he dropped some crystals of strychnine into his guest's coffee. In the convicts' colony he tried to do away with two fellow prisoners who had offended him.

Some of his murders were committed solely for gain, others for revenge, and some, it seems, "either from a mere caprice, or perhaps to quicken some hideous sense of power that was in him, or possibly for no reason at all." (Wilde, p. 73.) One day when he was reproached for the murder of the beautiful Helen, he shrugged his shoulders and said, "Yes, it was a dreadful thing to do; but then, her ankles were so thick." Those who knew him considered him a type of inborn genius combined with an equal measure of moral insensibility.

Shoplifting of a seemingly motiveless kind which the popular journalists designate "kleptomania" is often excused on the basis of being an inborn trait. However, inherent weaknesses, which when extreme may favor moral

lapse, in no way constitute a predetermined propulsion toward it. It is probable that the trait actually inherited is not a moral taint, but an underlying weakness which may favor criminal tendencies but is not itself a tendency to crime.

Delinquency in relation to environment. Unfavorable environmental conditions as possible causative factors for crime are more readily recognized than the inherited factors. Poverty, economic pressure, malnourishment, overwork, idleness, lack of play and recreation, bad companions, maltreatment, misunderstanding, and countless other conditions are only too commonly precursors as well as accompaniments of the misdemeanors of youth.

Mangold¹ considers the broken home as being probably the most important single proximate cause of delinquency. He shows that homes broken up by death of one or both parents, desertion, or divorce have yielded a large percentage of delinquent children. During the years 1916-20, the St. Louis courts dealt with 10,000 delinquent children concerning whom the parental conditions were known. Of these, 51.9 per cent had both parents living together, 11.5 per cent had parents separated or divorced, 25.5 per cent were orphaned or half-orphaned, and the remainder, 11.1 per cent, lived in homes where step-parents had been introduced. In all, 48.1 per cent of these children did not live in normal homes.

In investigating the conditions of child wage-earners, the Federal Government found interesting data on this problem, as is shown in Table XLIV.

A report of the Social Service Department of the Boys' Court of Chicago, a few years ago, stressed idleness as the root of most of the boys' wrongdoings, and especially of the

¹ Mangold, G. B. *Problems of Child Welfare*, p. 406. The Macmillan Company, 1924.

TABLE XLIV. PARENTAL CONDITION OF DELINQUENT CHILDREN

Parental condition	Percentage of delinquent boys			Percentage of delinquent girls		
	Working	Non-working	Total	Working	Non-working	Total
Normal.....	54.6	61.1	57.5	32.2	37.7	34.2
Half-orphan.....	25.2	23.2	24.3	28.8	26.5	27.9
Step-parents.....	9.2	7.5	8.5	11.7	17.2	13.6
One or both parents living away, orphaned or deserted..	11.0	8.2	9.7	27.3	18.6	24.3
Total number..	2412	1852	4264	351	204	555

boys brought up among sordid surroundings. The unfortunate aspect of this idleness is that it is enforced idleness. The report explained that boys who are taken to court are commonly considered "lazy, incompetent, and perhaps criminally inclined. Instead, *the majority are honest and capable*, and enforced idleness is the prime cause of their delinquency. Unemployment is responsible, indirectly, for at least 70 per cent of the offenses charged to boys in this court." Another statement of the report showed that habitual indulgence in liquor is practically unknown as a cause, for "Of 10,000 cases heard by the court not more than 50 had their inception in minds deranged by liquor." Cigarette-smoking, however, was found so frequently, and in such pronounced forms, as to approach the form of a mania.

Specific studies of causes. In order to determine the causes of truancy alone, a study of 100 typical cases of truancy was undertaken.¹ In this group only 6 per cent were found to be mentally deficient, while 68 per cent were normal

¹ See Groszman, *op. cit.*, p. 205. Study conducted by J. S. Hiatt, Secretary of the Public Education Association of Philadelphia. Published by the United States Bureau of Education, 1915.

and 26 per cent were backward. The real cause of chronic truancy was difficult to discover, and in all probability a complex of causes, thought the investigator, operated in bringing about the condition. Some of the contributing causes were listed, as follows:

Bad companions	20 per cent
Fault of home	29 per cent
Dislike of school	26 per cent
Desire to work	10 per cent
Illness	4 per cent
Fault of boy	11 per cent

In some cases there seemed to be no definite cause so far as the investigator could determine. For the teacher it is important to note that, according to the findings, 26 per cent of the boys become truant from dislike of school. The 10 per cent who desired work in all probability had their desire prompted, at least in part, by the same motive. This would mean that about one third of the entire group of truant boys cannot adapt themselves to the routine of school work. These boys are, as a rule, active, and find the sedative habits of the classroom with its abstract learning irksome.

Healy and Bronner found that bad companionship could fairly well be regarded as a causative factor in 62 per cent of 3000 cases of delinquency, and that the figures varied little for the sexes. While they realized that frequently the companions were not worse and perhaps even not so much to blame as the offender, still they concluded that in many cases, if it had not been for the companionship, the offense would not have been committed. They also pointed out that adolescent instability and impulses, factors often overlooked in dealing with young delinquents, frequently play a very considerable part in bringing on misdemeanor.

In view of the fact that newspapers, motion pictures, and pernicious stories are often considered malicious influences in

delinquency, it is interesting to note findings in this respect. Healy¹ found that in not a single case could he show that the reading of newspapers was a strong cause of criminality. He inquired about mental influences in many hundreds of cases, and, although other factors stood out clearly as affecting mental processes, the reading of newspapers did not. That this condition should obtain, in view of the fact that a very considerable proportion of the news space of the ordinary daily papers is taken up by accounts of criminalistic and other anti-social affairs,² seems strange. Healy explains this condition by the fact that most criminal careers are begun before there is extensive reading of the newspapers. Young delinquents seem to care for little but the comic sections; they seem to be just as much interested in accidents as in criminalistic material. Only rarely did Healy note the slightest indication that a newspaper story of a criminal developed hero worship.

In Healy and Bronner's study of 4000 delinquents they found that moving-picture shows seem to have very little effect in the production of delinquent tendencies. In only one per cent of the cases could they discover reason to attribute cause to this source.

The influence of pernicious stories was found, however, to be definite and widespread. This influence is established through definite mental processes; specifically, by arousing certain imagery which suggests action. The suggestion may be most powerful and frequently recurrent. "We have come to learn," says Healy, "that the perusal of a connected story of an exploit, or a career, may strongly impress itself upon the mind — so strongly as to incite like activities."

In explaining the difference in the effect between news-

¹ Healy, *op. cit.*, p. 302.

² Fenton, Frances. *The Influence of Newspaper Presentations upon the Growth of Crime*. Thesis, University of Chicago Press, 1911.

paper reading and dime-novel reading, Healy says that ordinarily there is no glamour whatever about the story of a criminal as told in the papers. He is nearly always pictured as a sufferer, either being hunted for or under duress. His sufferings are recounted. In the cheap novel the bandit is the hero. Then, too, the constant crowding of the newspapers with all sorts of ideas can but tend to militate against the influence of any single story. In the cheap novel the child has an opportunity to live the life story of the hero.

3. Physical condition and intelligence levels of delinquents

Physical condition of the delinquent. The physical condition of the delinquent children does not seem to be much different than that of non-delinquent. Healy and Bronner found by interpreting the physical conditions of their delinquent children, in terms of weight for age, that these children were not malnourished and underdeveloped. Their findings show surprisingly good conditions of development and nutrition for a very large share of the cases. While the median of the distribution in their groups ran very close to the curve for the norm of the general population, a variation above the curve is more extreme than below. That is, there were more boys who show overdevelopment or overnutrition than there were boys who showed underdevelopment or undernutrition. This physical overgrowth is considered to be in causal relationship with the tendency to adventurous delinquency. In regard to the girls, these investigators found that approximately 70 per cent of all the girls studied are above the general age-weight norm. "This is a significant fact," they point out, "and it falls in line with the common sense observations of many judges and others who note the frequent physical overdevelopment of girls who come before the juvenile court. There can be little doubt, by way of interpretation, that physical overdevelopment tends to draw

a girl's attention early to sex life, and that it leads her early to be attractive to the opposite sex."¹

Kelley,² in a study of delinquent boys in a state juvenile training school found that the delinquent boy was, on the

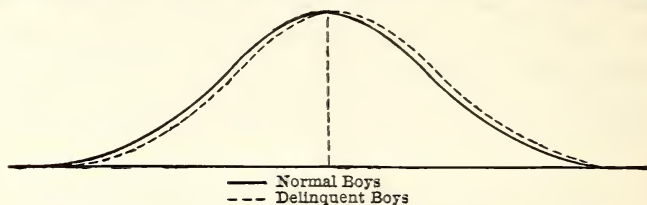


FIG. 63. DISTRIBUTION OF BOYS WITH REFERENCE TO HEIGHT
(After Kelley.)

average, .11 years in advance of the normal boy. In regard to weight, the delinquent boys exceeded the normal boy by a greater margin. The investigator pointed out that this condition might largely be due to the healthy, regular life

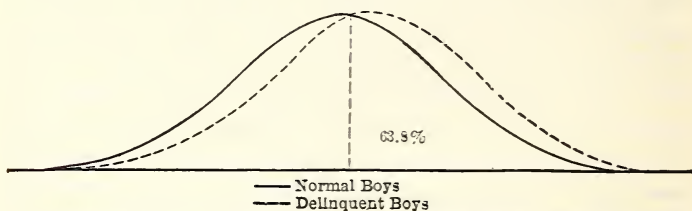


FIG. 64. DISTRIBUTION OF BOYS WITH REFERENCE TO WEIGHT
(After Kelley.)

and abundant food provided by the institution. This study, as well as others, found that the ten- and eleven-year-old boys in institutions for delinquency are relatively superior to the older boys in physical measurements. This condition

¹ From Healy and Bronner, *Delinquents and Criminals*, p. 138. By permission of The Macmillan Company, publishers.

² Kelley, T. L. *Mental Aspects of Delinquency*. University of Texas, 1917.

has been explained as probably being due to the fact that judges are more likely to commit large ten-year-old boys than undersized ones.

In regard to pubertal development, however, the delinquent boys were found to be below the normal boys. In Figure 65 the curves for delinquent boys are based upon 53 cases from 14 to 14.9 years of age.

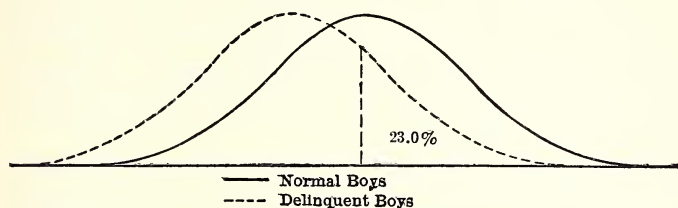


FIG. 65. DISTRIBUTION OF BOYS WITH REFERENCE TO PUBERTAL DEVELOPMENT
(After Kelley.)

Baldwin¹ has pointed out that the stage of pubertal development is an excellent criterion of mental capacity. In three psycho-motor tests — strength of grip with right hand, with left hand, and speed of tapping with right hand — the delinquent boys of Kelley's group were retarded .45, .42, and 1.39 years respectively.

In regard to stigmata of degeneration, no difference between delinquent and non-delinquent children has been found.

Healy and Bronner,² in their extensive study of delinquents, summarized the main points based upon physical examination of delinquents by saying that in general the delinquent group is closely similar to the general group of young people, in so far as standards for comparison exist. Physically the delinquent does not form a separate group nor

¹ Baldwin, Bird T. *Physical Growth and School Progress*. United States Bureau of Education Bulletin, no. 581. 1914.

² Healy and Bronner, *op. cit.*, chap. xiv, pp. 132-45.

is any particular physical condition, except overdevelopment of girls, found to be significant in relation to the later career of the offender.

Delinquency in relation to intelligence. We often think that the majority of criminals, at least of incarcerated criminals, are of low intelligence. Criminals with high intelligence are thought to be clever enough to evade imprisonment. Murchison¹ has shown us that it is not a lack of intelligence that makes one a criminal, and has given us some interesting findings of criminal intelligence. Some of his findings will be helpful in our study of the intelligence of the juvenile delinquent.

In a study of penitentiaries of Ohio, Indiana, and Illinois, Murchison found 72 college men among a total of 3429 white men criminals. That is, more than 2 per cent of these criminals were college trained. The investigator pointed out that "if education is not in any way a contributing cause of crime, according to the law of chance there should not be found more than 25 college men in the above group." In regard to the crimes committed, 76 per cent of the total number committed crimes of deceit and played the parts of thieves; of the 72 college men, 85 per cent committed crimes of deceit and played the part of thieves. Seventeen per cent of the total number committed crimes of violence, but only 3 per cent of the college men committed such crimes. Seven per cent of the total number committed sex crimes, while 11 per cent of the college men were guilty of such crimes.

In regard to age, the average age of the 3429 criminals was 28.7 years, while that of the college criminals was 35.

On the basis of the Alpha Intelligence Test, a scale offering a range from 0 to 212, the median intelligence of 3328 white criminals was found to be 62, the same median intelligence

¹ Murchison, C. "College Men Behind Prison Walls"; in *School and Society*, June 4, 1921, p. 633 ff.; and July 3, 1920, p. 24 ff.

grade found in the recent American army, including officers. Thus, if the white army men were representative of the intelligence of the white American people, the white inmates of our penitentiaries are equally representative of that intelligence.

The investigator arranged the various crimes on a scale according to the median intelligence of the measured criminals who had committed each crime, and obtained the following results:

TABLE XLV. MEDIAN PSYCHOLOGICAL GRADES (ALPHA INTELLIGENCE TEST) OF VARIOUS CRIMINAL TYPES OF A TOTAL 3328 WHITE PENITENTIARY INMATES

(From Murchison)

Number of criminals	Crime	Median psychological grade
9	Having burglar tools.....	91
8	Conspiracy.....	84
19	Embezzlement.....	81
725	Larceny.....	80
6	Obtaining property under false pretenses...	79
25	Confidence game.....	79
35	Assault and battery to rob.....	73
178	Forgery.....	69
525	Robbery.....	68
15	Issuing fraudulent check.....	66
41	Burglary of inhabited dwelling.....	64
42	Entering to commit felony.....	63
773	Burglary.....	62
60	Vehicle taking.....	62
22	Horse stealing.....	61
46	Pocket picking.....	61
221	Murder, first degree.....	58
108	Assault and battery to kill or rape.....	55
48	Abandonment.....	51
18	Bigamy.....	51
102	Rape.....	50
9	Indecent liberty with child.....	46
25	Sodomy.....	42
25	Incest.....	41
78	Manslaughter.....	36
98	Murder, second degree.....	34
51	Cut, stab, or shoot to kill or wound.....	34
16	Vagrancy.....	11

In regard to these data their compiler says that:

It will be noticed that the twelve crimes that occur nearer the bottom of the scale are crimes against the person, crimes very concrete in their nature — the stimulus consisting of a definite human object. But the sixteen crimes nearer the top of the scale are crimes against property, crimes more abstract in their nature — the stimulus being ideas of interpreted value, successful procedure requiring visualization and abstraction. The conclusion seems to be that lack of intelligence does not cause crime — it only determines what particular crime one will be interested in if one is interested in crime at all.

It seems, then, that interest which is based upon intellectual ability determines at what a person will be successful in crime, just as in occupations and school work.

Williams's study of California delinquents. Williams¹ studied 470 boys and young men, between the ages of six and twenty-two years, in one of the California state institutions for delinquent boys. Table XLVI gives his findings

TABLE XLVI. MEDIAN I.Q.'s (STANFORD REVISION) OF VARIOUS DELINQUENT TYPES OF 470 STUDENTS AT A STATE INDUSTRIAL SCHOOL FOR BOYS

(From Williams)

Number of cases	Offense	Range of I.Q.'s	Median I.Q.
49	Larceny	59-114	84
21	Truancy	58-135	84
36	Incorrigibility	54- 97	82
114	Stealing	54-118	81
14	Forgery	71-102	80
25	Vagrancy	53-104	80
110	Burglary	47-116	79
11	Assault	67-115	79
8	Highway robbery	58-111	78
6	Drunkenness	67-122	78
27	Dependency	53-110	77
5	Arson	62- 78	74
2	Murder	56- 68	62

¹ Williams, J. Harold. "The Intelligence of the Delinquent Boy"; in *Journal of Delinquency*, Monograph no. 1, 1919.

in regard to the distribution of offenses, in order of median intelligence quotients on the Stanford Revision of the Binet Scale.

While the number of cases is too few from which to draw conclusions in regard to the grade of intelligence and the nature of crime or offense, interesting comparisons can be made with the data of this table and those of Murchison's table.

TABLE XLVII. DISTRIBUTION OF PRINCIPAL JUVENILE OFFENSES BY SOCIAL-INTELLIGENCE GROUPS

(From Williams)

Offense	F.M.	Bord.	D. Nor.	Av. Nor.	Sup.	Total	Per cent
1. Stealing	30	31	23	26	3	114	24.25
2. Burglary	37	30	22	20	1	110	23.40
3. Larceny	11	1	18	8	5	49	10.43
4. Immorality	17	10	8	7	..	42	8.94
5. Incurability	10	8	11	7	..	36	7.66
6. Dependency	9	11	4	2	1	27	5.75
7. Vagrancy	7	8	4	6	..	25	5.32
8. Truancy	5	5	4	6	1	21	4.45
9. Forgery	1	7	2	4	..	14	2.98
10. Assault	5	3	..	2	1	11	2.34
11. Highway robbery..	2	3	..	2	1	8	1.70
12. Drunkenness	1	3	1	..	1	6	1.27
13. Arson	3	2	..	..	..	5	1.06
14. Murder	2	..	..	..	..	2	0.43
Total	141	128	97	90	14	470	100.00

In another table (Table XLVII) Williams has arranged the principal offenses by social-intelligence groups. From this it can be seen that nearly all intelligence groups are represented in all offenses except those with but a few cases reported. When the total number of offenses is divided into so many small groups, an opportunity for little more than conjecture as to the relation between the social-intelligence group and the nature of the offense is provided.

It is evident that feeble-mindedness is more closely associated with some offenses than with others; forgery, drunkenness, and larceny have the least proportions, while murder, arson, and assault have the greatest proportions.

Healy and Bronner,¹ in studying the intelligence of a group of 1625 boy repeated offenders in Boston, found that their intelligence quotients approximated the normal curve of distribution. In comparing these findings with the intelligence quotients of the general population, the investigators consider that the apex of the curve on their chart is very close to that for American citizens in general, if the 14-year level were used as the average adult intelligence, as some authorities² claim would be more representative of the general population.

The distribution of girls in the 701 cases tested did not follow the normal curve of distribution. This is explained by the fact that forces are at work selecting girls who are brought into court, and who are brought for study by social agencies endeavoring to help without bringing the girls into court. This has been the case with many delinquent girls, even repeated offenders.

Institutional cases run higher. Many investigations have been carried on in order to determine the intellectual status of criminals and delinquents. Healy and Bronner, as reported above, find little difference in regard to the intelligence of large groups of delinquent children, in comparison with non-delinquent children. Other investigators, however, report an intimate relationship between feeble-mindedness and delinquency. Some of the earlier surveys, carried out while the Binet test was still in its early unfinished form and when enthusiasm for the test method resulted in the overlooking of other pertinent data, are not of as great

¹ Healy and Bronner, *op. cit.*, p. 153.

² See Brigham, C. C. *A Study of American Intelligence*. Princeton.

value as their sponsors claim. Some investigators so mutilated the scale by arbitrarily shifting tests to different years, omitting certain tests, and modifying the procedure that their data, naturally, would be of little value. The differences in test procedure, perhaps, account for the wide range of feeble-mindedness reported among delinquents. Some investigators reported 10 per cent of feeble-mindedness among delinquents; others as high as 90 per cent. It is true that factors influencing the selection of institutional cases are of great importance, but it is quite improbable that different institutions for delinquent children contain such varying proportions of feeble-minded individuals as reported by the early investigations. Fernald¹ has shown us the need for adopting more uniform standards for determining who is feeble-minded. She carefully examined 100 inmates of the Bedford (New York) Reformatory for women, and scored the results of the tests according to the criteria adopted by different workers for defining feeble-mindedness. The several standards gave proportions of feeble-mindedness varying from 34 per cent to 100 per cent for the same group of individuals. The proportion having an I.Q. of less than .70 by the Stanford Revision of the Binet scale was found to be 48 per cent.

While our standards for uniformity are gradually becoming more satisfactory, we must keep Fernald's findings in mind when evaluating early data in regard to the intelligence of young delinquents. We must also bear in mind that committed cases, that is, institutional cases, are more apt to show higher percentages of feeble-mindedness than juvenile court cases. Often delinquents are committed to institutions not because their offenses are more serious, but be-

¹ Fernald, Mabel R. "Practical Application of Psychology to the Problem of a Clearing House"; in *Journal of Criminal Law and Criminology*, vol. 7, no. 5, pp. 722-31. (January, 1917.)

cause of their mental condition they are thought to be better protected in institutions.¹

Girls vs. boys. Delinquent girls have quite generally been found to be mentally more backward than delinquent boys. Otis² made a study of 172 delinquent girls in the New Jersey State Home for Girls, white with 2 exceptions, average age 17. She says:

That so many of the language tests are difficult for them is very significant, and this deficiency is further corroborated by the work they do in school, and by the testimony of the officers who have them in charge. The girls come from a class in society where fluency in language is not a pronounced characteristic. They have had no training in expressing thought, either at home or at school, for in examining the question of school training we find that most of the girls have had little or none.... With such limited school training, it is no wonder that the girls lack ability to express themselves, and show themselves deficient in the language tests, for the ability to use language depends more than any other on training, whether at school or at home.

Immorality among girls is an offense that society never forgives; the offenders are permanently outcasts in all classes of society. Only the mentally weak are apt to forget or are unable to comprehend this situation. Terman³ points out, in the following statements, that feeble-minded individuals are always to be considered as potential delinquents or criminals.

But why do the feeble-minded tend so strongly to become delinquent? The answer may be stated in simple terms. Morality depends upon two things: (a) the ability to foresee and to weigh the possible consequences for self and others of different kinds of behavior; and (b) upon the willingness and capacity to exercise self-restraint. That there are many intelligent criminals is due to the

¹ See Williams, *op. cit.*, p. 38, for a table of twenty-eight summaries of investigations of the extent of feeble-mindedness among delinquents. The percentages found range from 10 to 68.

² Otis, Margaret. "The Binet Test Applied to Delinquent Girls"; in *The Psychological Clinic*, vol. 7, no. 5, p. 131. (October 15, 1913.)

³ Terman, L. M. *The Measurement of Intelligence*, p. 11. Houghton Mifflin Company, 1916.

fact that (a) may exist without (b). On the other hand, (b) presupposes (a). In other words, not all criminals are feeble-minded, but all feeble-minded are at least potential criminals. That every feeble-minded woman is a potential prostitute would hardly be disputed by any one. Moral judgment, like business judgment, social judgment, or any other kind of higher thought process, is a function of intelligence. Morality cannot flower and fruit if intelligence remains infantile.

It is interesting to note that conditions obtaining in regard to girl delinquents seem to persist in the case of white women criminals. Murchison¹ has pointed out that women criminals in Ohio tend to score lower in the Alpha mental test than do the majority of men criminals in the same State. Since there are no norms for women from the general population of Ohio with which to compare the 85 women criminals available at the time of his study, Murchison compared them with the native-born white men criminals in the Ohio penitentiaries. The following table gives his findings:

TABLE XLVIII. COMPARISON OF ALPHA INTELLIGENCE SCORES OF WOMEN CRIMINALS AND MEN CRIMINALS

Alpha scores	(From Murchison)	
	Native-born white women criminals (85 cases)	Native-born white men criminals in Ohio (1418 cases)
0- 9.....	..	3.4
10- 14.....	4.7	3.1
15- 19.....	5.9	2.9
20- 24.....	5.9	2.9
25- 34.....	16.4	8.5
35- 44.....	14.1	9.9
45- 59.....	14.1	15.0
60- 74.....	16.4	14.6
75- 89.....	13.0	12.3
90-104.....	4.7	10.9
105-119.....	3.5	7.3
120-134.....	1.2	4.2
135-149.....	...	2.8
150-212.....	...	2.2

¹ Murchison, Carl. *Criminal Intelligence*, p. 32 ff. Clark University Press, 1926.

Criminality in relation to religion. No study has been made of the religious status of child delinquents, as Murchison has made of adult criminals. Since we can assume that our adult criminals are recruited from the ranks of juvenile delinquents, it is reasonable to infer that there may be a similarity between the religious status of the two recalcitrant groups. Although the findings may not be conducive to mental tranquillity, it is better to recognize existing conditions than to ignore them complacently.

Murchison's¹ investigation found that most criminals belong to some church, and frankly admit that fact. Of the men in the Maryland Penitentiary, 43.5 per cent belong to some Protestant church, 34.4 per cent belong to some Catholic church, 7.8 per cent are Hebrews, while 14.3 per cent are frankly agnostic. Although almost all churches are represented in this group, those of less than eight cases were ignored in compiling findings.

The Hebrews and the agnostics seemed to demonstrate a much greater ability to make high scores in the Alpha test than did the Catholics and the general Protestant group. However, the Protestants demonstrated much greater ability in this respect than did the Catholics.

Table XLIX shows the percentage of criminals of each religion that committed each type of crime.

In explanation the investigator says:

The Methodists and Catholics comprise approximately 50 per cent of the prison population, but commit more than 85 per cent of all sex crimes. The Presbyterians, Episcopalians, and Hebrews are strong on fraud. The agnostics, Methodists, and Lutherans are inclined to be strong on crimes of physical injury. The Baptists and agnostics are superior in obtaining property by force. The vast majority follow the law of force — being either robbers or murderers. The Methodists and Hebrews are superior as plain thieves.

¹ Murchison, *op. cit.*, p. 243 ff.

The recidivists were found to be recruited chiefly from the ranks of the Catholics and the agnostics. "Outbreeding of religion seems to produce a more intelligent criminal than does inbreeding." That is, in terms of Alpha scores, the intelligence of criminals whose parents belong to different churches was superior to the intelligence of the criminal both of whose parents belonged to the same church.

TABLE XLIX. PERCENTAGE OF EACH RELIGION THAT COMMITTED EACH TYPE OF CRIME. 239 CASES FROM MARYLAND PENITENTIARY

(From Murchison)

Religion	Type of Crime					
	Fraud (Per cent)	Force (Per cent)	Thievery (Per cent)	Physical injury (Per cent)	Dereliction (Per cent)	Sex (Per cent)
Presbyterian....	50	37.5	12.5	....	...	....
Episcopal.....	30	40	20	10	...	....
Agnostic.....	2.6	60.5	13.2	23.7	...	....
Hebrew.....	25	30	35	10	...	....
Methodist.....	12.2	22	34.1	22	...	10
Baptist.....	18.2	45.4	18.2	2.4	9.1	2.4
Lutheran.....	....	42.8	21.1	28.6	...	7.1
Catholic.....	5.7	42.5	23	13.8	4.6	9.2

Without generalizing upon the data, Healy and Bronner presented court statistics of the religions of the total delinquents in the Chicago Juvenile Court, in 1910. The following table gives these data:

TABLE L. COURT STATISTICS OF RELIGIONS OF TOTAL NUMBER OF CHICAGO JUVENILE COURT CASES IN 1910

Religion	Boys	Girls
Catholic.....	694 (60 per cent)	236 (50 per cent)
Protestant.....	335 (29 per cent)	197 (42 per cent)
Jewish.....	91 (8 per cent)	25 (5 per cent)
Not stated.....	41 (3 per cent)	15 (3 per cent)
No religion.....	....	2
Unknown.....	....	....
Totals.....	1161	475

Delinquency in relation to scholastic achievement. Data in regard to the school progress or scholastic achievement as determined by standardized educational tests are not available. Kelley¹ found an average retardation of his group of delinquent boys to be no less than 4.6 years. The standing of the boys was based upon school classification, and would be influenced by many subjective factors. In commenting upon the great retardation of the boys, Kelley says:

In view of the fact that poor mental capacity, eye defect, hardness of hearing, general lack of parental control or concern, and indifference on the part of school authorities to absence from school, if, in fact, not an actual encouragement that the "bad" boy stay away, all conspire to keep the child out of school, it is not surprising that 50 per cent of the delinquent boys do not reach a school standing equal to that reached by the slowest 1 per cent of those who attend school. This would, indeed, be an appalling situation were it not for the fact that it is very largely subject to social control.

The Bridges,² in a study of 104 cases at a training school for delinquent boys in Canada, report the average age of the boys in each of the eight grades represented was from two to four years higher than the average age for the same grade in the ordinary school. They explain the educational retardation to the dullness of the boys. No standardized educational tests were used.

Delinquency in relation to emotional stability. While subnormal intelligence is recognized as being one important factor in the production of delinquency, other factors of temperament and character also play major rôles. Although no quantitative methods comparable with the exactness of the intelligence tests are available for measuring these traits, the tests available are far more satisfactory than subjective

¹ Kelley, *op. cit.*, pp. 33-35.

² Bridges, J. W. and K. M. B. "A Psychological Study of Juvenile Delinquency by Group Methods"; in *Genetic Psychology Monographs*, vol. 1, no. 5, pp. 411-506.

conjecture. The Woodworth¹ questionnaire for detecting psychoneurotic symptoms consists of one hundred and sixteen questions to be answered by *Yes* or *No*. In each case one of the answers indicates normality in that respect, while the other is symptomatic. Mathews² adapted this test for children. In giving the test to five hundred and twenty-two American school boys, Mathews found a consistent decrease of average score with increasing age. This is interpreted to mean that greater maturity and consequent greater emotional stability are attained simultaneously.

The Bridges³ gave the Mathews questionnaire to ninety-eight delinquent boys. Their median score was twenty-one symptomatic responses, as compared with nine for the unselected school boys studied by Mathews. The average scores were approximately the same from the nine- to the eighteen-year-old group. In the case of Mathews's unselected boys there was a great decrease with increase in age. The inference is that the delinquent boys as a group failed to "grow up" in the traits investigated by the questionnaire. The Mathews scores correlated only very slightly with the mental ability of the delinquent children; that is, it would be quite impossible to predict the one from the other. Similarly there was but a slight relationship between Mathews scores and intelligence quotients. This means that delinquent boys of normal intelligence may deviate from the norm in traits other than intelligence such as temperamental characteristics investigated by the Mathews questionnaire.

In comparing symptomatic responses given by delinquent with non-delinquent boys, the investigators found the follow-

¹ Described in *A Handbook of Mental Examination Methods*, pp. 170-76, by S. I. Franz. New York, 1920.

² Mathews, Ellen. "A Study of Emotional Stability in Children by Means of a Questionnaire"; in *Journal of Delinquency*, vol. 8, pp. 1-40. (1923.)

³ Bridges and Bridges, *op. cit.*, chap. III, pp. 440-56.

ing characteristics in the case of the delinquent boys: (1) pronounced conflicts with home, school, and persons; (2) tendency to develop mild delusions of reference and persecution; (3) many physical ailments, such as pains, fatigue, lack of energy, and disturbed sleep; (4) frequent motor incoördination, stuttering, stumbling, or other form of awkwardness; (5) abnormal impulses, especially to steal and to set fire; (6) morbid depression; and (7) tendency to bully.

Delinquency in relation to moral judgment, worries, and interests. The Pressey Test for Investigating the Emotions,¹ Form B, is really a test for investigating moral judgment, worries, and interests. It is composed of three separate tests of a hundred and twenty-five specially selected words, arranged in twenty-five lines of five words each. In Test I the subject is required to first cross out everything that he thinks is wrong, that a person can be blamed for. Then, after a similar task in Tests II and III, he must go back to Test I and encircle in every line the one thing that he thinks is worst. Test II is concerned with worries and obsessions. After crossing out everything about which the subject has worried or felt anxious or nervous, he is required to encircle in each line the one thing that he has worried about most. In the third test the subject first crosses out everything that he likes or is interested in and then encircles the one thing that he likes best in each line. There are two scores for each test: (1) the total score, that is the total number of words crossed out in each test; and (2) the deviation score, the number of words circled in each test which are other than (which deviate from) the word most frequently encircled by three hundred and eighty-eight college students examined by the originators of the test. The total scores

¹ Pressey, S. L. and L. W. "'Cross-Out' Tests, with Suggestions as to a Group Scale of the Emotions"; in *Journal of Applied Psychology*, vol. 3, pp. 138-50. (1919.)

furnish "an emotionality index," and the deviation scores offer "an index of idiosyncrasy or eccentricity."

The Bridges¹ gave the Pressey Cross-Out Test for Investigating the Emotions, Form B, to eighty-seven delinquent boys. They found that both the total and the deviation scores of the delinquent boys varied greatly from subject to subject. The delinquent boys considered fewer things wrong, but had more worries than non-delinquent students. In comparing Pressey scores with intelligence quotients, the comparison showed that not only things considered wrong but also worries and interests increased in number with the increase in I.Q.'s from marked dullness to average brightness. The moral judgment of the bright boys was found to be more like the non-delinquent boys than was that of the dull ones. The words most frequently encircled by the delinquent boys differed considerably from the modal-choice words of college students. The delinquent boys were found to be concerned more with moral problems which had some relationship to their delinquencies and to the local situation. Test II indicated a presence of abnormal worries and anxieties among these boys, and Test III showed that their special interests are chiefly in active outdoor occupations.

In summarizing their findings, the above-mentioned investigators pointed out that their study revealed an aberration of instinct and emotion in the delinquent group of boys. The chief abnormalities brought out were: (1) A marked dominance of the ego instincts, manifested in egotism, aggressiveness, impudence, and contrariness, as well as in conflicts with persons and institutions and in inferiority feelings and their overcompensation. (2) Deficiency in social instincts, manifesting itself in the form of deficiency in sensitivity to social approval and disapproval rather than

¹ Bridges and Bridges, *op. cit.*, chap. iv, pp. 457-80.

lack of gregariousness. (3) Exaggerated pugnacity and anger as expressed in impudence and bullying, or less directly in contrariness and grouching. (4) Exaggeration of the acquisitive impulse, showing itself directly, perhaps, in the pilfering type of delinquency.

The delinquent as a psychopath. Mateer's¹ study of delinquent children led her to just one concept — that delinquent children are different. She found them to be

highly variable in their qualities, most inconsistent in their abilities and their disabilities, surprisingly able, and surprisingly stupid, erratic, and queer. They are overquick and very slow, non-adaptive and non-persistent, forgetful, and laboriously remindful. They are psychopaths.

The medical findings indicate their inferiority physically, their disturbed nervous systems, their stigmata of imperfect development. They live under the handicap of poor eyes, poor hearing, poor teeth, with many types of functional disturbances, bearing the additional burden of inherited disease in many instances.

Their family histories tell why they are as they are. They merely reflect the condition of their parents in many instances. Feeble-mindedness, insanity, neuropathic diatheses, and all they imply, have had an important share in furnishing these children. They are not willful delinquents. They are psychopaths, the unstable children of the unfit.

Delinquency meets its explanation in the psychological laboratory. Feeble-mindedness causes some of it. Lack of right training and right opportunity causes its share. But the chief reason for wrong behavior is the wrong working of the delinquents themselves, their diseases, disturbed, unreliable modes of mental behavior. The understanding of them lies in the study of their psychopathy. But psychopathy itself demands an explanation. The solution of its existence leads back to the physio-medical study of the individual. In some instances, such study seems to explain the psychopathy, but where further research of this type will lead, one can scarcely say, but surely into the fields of medical and social hygiene, as well as into the province of mental hygiene....

¹ Mateer, Florence. *The Unstable Child*, p. 454. D. Appleton and Company, 1924.

Mateer considers the fact that delinquents are psychopaths a promise for the future because psychopathy has not yet been studied very intensively, but "enough has been done," she says, "to make it clear that at least some of them will gain, stabilize, normalize under the right kind of care. Given a chance to study them in their earlier years, much more preventive work may be done and less corrective work will be necessary."¹

4. *The outcome of treatment*

Delinquency and juvenile courts. Juvenile courts,² in regard to legislation, jurisdiction, organization, and procedure, vary considerably in different States. In common law no provision was made for those below the age of responsibility; in the juvenile-court law provision was made for these individuals under the name of "delinquents." Responsibility does not necessarily go with punishment, for the juvenile-court law recognizes responsibility, but uses protection and education rather than punishment in endeavoring to establish reformation. It stands for prevention as well as cure. In regard to specific methods of treatment, some States require restitution for property taken or reparation for damage done (primarily for the educational effect on the child). In some States money penalties are required.³ Customary

¹ Mateer, *op. cit.*, p. 459.

² See Lou, H. H. *Juvenile Courts in the United States*. University of North Carolina Press, 1927. Also Lenroot, Katherine F., and Lundberg, Emma O. *Juvenile Courts at Work*. United States Department of Labor, Children's Bureau, Bureau Publication no. 141. Washington, 1925.

³ A Michigan act which authorized the juvenile court founded upon the chancery idea to impose a fine was declared unconstitutional. In some States the courts may still legally use this form of punishment; in some it is occasionally used without express legislative sanction. Miss Belden found, in 1918, that some courts in thirty-eight States used this method to dispose of cases. See Belden, Evelina; *Courts in the United States Hearing Children's Cases*. United States Children's Bureau, Publication no. 65. (1920.)

practices common to most juvenile courts include placing children on probation under the supervision of a probation officer, home placement, and commitment to institutions.

Frequency of juvenile court cases. According to the United States Children's Bureau, about 175,000 children's cases were heard in our juvenile courts during the year 1918. Some of these cases were classed as neglected or dependent, but at least more than 100,000 were charged with delinquency. It is difficult to estimate the number of juvenile delinquents in the United States when we include the number handled out of court and the number in our institutions. In 1918 the number in our institutions¹ was 63,762. The number of institution cases at present is limited by the capacity of our institutions. In many States only the very worst cases are sent to institutions, because the crowded conditions do not permit accommodations for all that should be under strict supervision.

The proportion of delinquent children is smaller in rural districts than in the cities, partly because of a more favorable environment. Mangold claims that, in many cities, from 7 to 10 per cent of the boys acquire a juvenile record.

Delinquency in relation to outcome of treatment. Each year an enormous number of young delinquents come before the juvenile court. It is of great moment to know how effective the influence of the court proves to be. Healy and Bronner² made a follow-up study of about 1000 Chicago delinquents in an endeavor to determine how many youthful offenders cease their delinquency, and how many later become criminals. They were interested also in determining what differences, if any, existed concerning the treatment of the two groups.

¹ Mangold, *op. cit.*

² Healy and Bronner, *op. cit.*, chap. III, pp. 27-38.

In regard to the outcomes of 675 Chicago cases, the following table shows the percentages of successes and failures:

TABLE LI. OUTCOMES OF 675 CHICAGO DELINQUENTS

(Healy and Bronner)

	Males	Females	Total
Success.....	164 (39%)	138 (54%)	302 (45%)
Failure.....	256 (61%)	117 (46%)	373 (55%)
	<u>420 (100%)</u>	<u>255 (100%)</u>	<u>675 (100%)</u>

These figures show that, gauged by outcomes in adult life, more of these young delinquents failed to make good than succeeded. If the responsibility is to be placed either with the court or with the correctional institution that had charge of these cases, then we must consider these agencies as failing more often than succeeding in their mission.

In regard to the great difference in outcomes for the sexes, the investigators pointed out that this is in striking contradiction to the tradition that it is extremely difficult for a girl who has been immoral to retrieve herself. The earlier data showed that over half of the girls in the study appeared in court as sex offenders, and 75 per cent of them were to be classified as such sometime during juvenile court age.

Two case studies of outcomes. In regard to the differences in outcomes, it was considered quite certain that special interest and greater effort may have been given to girls' cases, at least sufficient to account for their relatively greater success.

The criteria of Successes and Failures were based almost entirely upon the keeping or breaking of laws or moral codes. If the individuals were apparently maintaining themselves in a community without coming into contact with the law, or were not complained of by their families or welfare agencies, they were considered Successes. Failure so to maintain themselves branded these delinquents as Failures. The degree of failure was usually much greater for males.

A summary of a case study may, perhaps, make the picture of failure more vivid.

Case study. A., one of the most desperate young criminals ever known in Chicago, first appeared before the Juvenile Psychopathic Institute when he was fifteen years old. He had been arrested several times by the police for minor offenses, such as staying away from home or gambling, and he had already, during two or three years, established a reputation with the police by engaging in fights with them. When brought before the Institute, he was accused of being implicated in the death of a peddler, who was shot by some one of a crowd of boys who had robbed him. There was no direct evidence that this boy did the shooting, although outside the courtroom he boastfully maintained that he had. It was perfectly clear that he was mentally abnormal, an overactive, extremely excitable fellow of somewhat poor intelligence. His constitutional excitability was accentuated at times into a frenzied condition, when he was extraordinarily reckless. He was engaged in excessively bad habits, smoking, drinking, and sex immorality with girls, by whom he was evidently liked because of his volubility and general liveliness.

When sent to a correctional school he readily ran away and then was at large, part of the time at home, without supervision of either probation or parole officers, and utterly reckless, especially about encounters with the police. He was once shot and slightly wounded by a policeman. He himself shot at a fellow with whom he had a quarrel, and he had by this time become a regular "hold-up man" and burglar. After a few months at another correctional school he was released, only to become a member of a gang of "auto bandits." At eighteen he committed murder for which he was convicted. In the courtroom he made a serious attempt to injure the judge who sentenced him for a long term of years. In the penitentiary he has desperately attacked guards and made bold attempts to escape. (Summarized from Healy and Bronner.)

The case cited illustrates a failure on the part of treatment rather than of the individual, since the boy was definitely recognized to be mentally diseased early in boyhood. Although urgently recommended by diagnosticians to be subjected to prolonged segregation and care the recommenda-

tions were not carried out, because there is little provision for adequate treatment of children and young people with psychoses. Criminalistic ideation or tendencies, incited by associates, could not be inhibited by this mentally affected individual. The treatment accorded him served only to add to his tendencies.

Another case is illustrative of successful outcome:

Case study. V., fifteen years old, unenergetic, with weak features and babyish voice, lied excessively in a silly manner to the judge and to us. Now in court for a serious but foolishly undertaken burglary and larceny, he had earlier appeared for petty stealing, and had been in homosexual affairs with a man. His irrationality was shown in his delinquencies as well as in his conversation and general behavior, though his school progress had been fair and he did not grade as defective. He was classified by us as psychotic, without definite diagnosis, but perhaps dementia præcox. His mother, though the victim of mental disease, lived at home; his father had a court record for abusing his family. This boy was placed on probation and a place found for him away from his miserable home. He had no further police record, and worked until he entered the army. Upon release from service he became part owner of a store which he runs successfully, and supports a wife and child. (Summarized from Healy and Bronner.)

Outcomes by offenses committed. It would be of great value to know differentiations of Successes and Failures on the basis of offenses committed, for outcome depends upon type as well as extent of offense engaged in by the young delinquent. In Table LII, Healy and Bronner give the outcome of 675 delinquents whose offenses were known when the investigation was begun. It is pointed out that one great difficulty in drawing conclusions lies in the fact that at the time of the study of the case a large majority of the young delinquents had already committed more than one offense. There are too few cases of any one kind, too, to give proportions of Success and Failure any great signifi-

cance. However, suggestions of salient facts are to be obtained from scanning the table.

TABLE LII. OUTCOME OF 675 CHICAGO DELINQUENTS WHOSE OFFENSES WERE KNOWN AT TIME OF JUVENILE AGE

(From Healy and Bronner)

	420 Boys		255 Girls	
	Success	Failure	Success	Failure
Offenses against property:				
Petty stealing.....	31 (49%)	32 (51%)	..	..
Larceny.....	51 (27%)	139 (73%)	..	..
Stealing (including shop-lifting).....	..	...	49 (59%)	34 (41%)
Major breaking and entering (burglary).....	8 (31%)	18 (69%)	..	..
Automobile stealing.....	2	3	..	..
Picking pockets in professional way.....	1	3	..	..
Forgery.....	3	2	1	1
Swindling.....	1	3	0	1
Arson.....	2	1	1	1
Offenses against the person:				
Violent behavior at home.....	6 (23%)	20 (77%)	1	4
Assault and battery.....	5 (33%)	10 (67%)	0	2
"Hold-up".....	1	2	..	..
Cruelty to children.....	1	1	..	..
Attempt to poison.....	1	0	1	2
False accusation.....	..	...	5	3
Offenses of sex nature:				
Sex (with boys).....	10 (37%)	17 (63%)	..	..
Abnormal sex (with men).....	3 (18%)	14 (82%)	..	..
With opposite sex.....	2	4	72 (53%)	65 (47%)
Exhibitionism.....	1	2	1	0
Sex perversion.....	..	...	1	2
Offenses against social regulations:				
Truancy.....	49 (39%)	77 (61%)	9	4
Complaint of general incorrigibility.....	21 (37%)	35 (63%)	16 (44%)	20 (56%)
Running away from home.....	64 (37%)	110 (63%)	37 (49%)	39 (51%)
Out late nights or all night.....	17 (49%)	18 (51%)	8 (36%)	14 (64%)
Vagrancy.....	2	6	..	..
Loafing (excessive).....	20 (47%)	23 (53%)	5	6
Drinking (excessive).....	2	2	0	1
Gambling (excessive).....	4	6	..	..
Lying (excessive).....	20 (44%)	25 (56%)	27 (52%)	25 (48%)

The most important fact in this table is that there is a small percentage of Success outcome for any special category of delinquencies committed by the boys. For offenses committed most frequently — stealing, truancy, running away — only about one third were Successes in Chicago. No type of offense shows Success outcome in more than 50 per cent of the cases.

Whether the greater severity of the offenses in Chicago, even though the offenses come under the same groupings, has anything to do with the relatively unfavorable outcome, the investigators hesitated to say. They did say, however, that while they had no other such carefully studied and followed-up series for comparison with the Chicago group, they knew that the general outcomes of an analogous series of delinquents in Boston appeared much better, and consequently that engaging in the same types of offenses does not necessarily mean that the outcomes of cases are similar.

CASE STUDIES

1. *Kleptomania*

The case. Theodora is eight years of age, and has an I.Q. of 125. She is an only child of well-to-do, intelligent, and upright parents. When six years of age Theodora twice took money from a purse in her teacher's coat pocket. On several occasions she also took money from the purses of guests who came to call on her mother. A local merchant and friend of Theodora's parents informed the parents that Theodora often took small articles from his store; she would often take articles for which she would have little use, such as thread or laundry soap. She always concealed her theft carefully, and her mother never saw any of the articles taken by the child.

The parents are heartbroken over Theodora's "taking ways," and are coöperating with the school and local merchants in trying to break the child's unfortunate habit. She has had an ample allowance since she was five years of age, and as a rule does not spend all of it; she usually also spends her money wisely. She has superior

moral concepts, and in formal tests for honesty (knowledge of honesty) she makes much higher scores than her classmates.

Query. How would you proceed in breaking this habit in this child?

2. *A promising incendiary*

The case. Billie O. is eight years of age, and has an I.Q. of 85. He is the third of six children. From early childhood the boy delighted in watching a blazing fire. When he grew older his parents, people of the unskilled labor class, were compelled to hide their matches in strange places and to change the hiding places frequently, for Billie succeeded in finding hidden matches and starting fires on several occasions. Up to the present the child has only two conflagrations to his record — a garage and a woodshed, both small buildings. Many fires started by the child that could have been serious were discovered in time. Whenever Billie sets anything afire his father gives him a sound, but not severe, spanking.

None of Billie's brothers or sisters has shown any delinquent tendencies. When Billie plays with matches he is always alone; he has learned that his playmates, frightened by former mishaps, will tell adults of such activities. After the garage burned the fire department and neighbors made inquiry in regard to the origin of the fire. When many were proffering guesses as to the origin, Billie also coolly volunteered possible origins without involving himself.

Queries. Would you be worried in this trait in an eight-year-old child? How would you try to overcome it? Without corrective procedure, what outcome do you predict for Billie?

3. *A potential murderess*

The case. Susan B. is the youngest of five children; her brothers and sisters are from fifteen to twenty years her senior. Because Susan is so much younger than her brothers and sisters, and has so many charming ways, she has received a great deal of attention and overindulgence. She is now six years old, and is alarming her family by her cruel treatment of children and animals. She discovered a nestful of young birds a short time ago, and tore off their heads. When her mother discovered her, Susan was quite happy over her act, and was looking for more birds' nests. Her torture of pets, beginning to show itself at about four or five years, was soon so extreme that Susan could no longer have pets. One day friends with a small baby were calling on Susan's mother; the baby was

asleep and was placed upon a bed in the bedroom. When the guests were ready to leave, the baby was gone. After a frantic search, it was found under some shrubbery in the back yard — fortunately unharmed. Susan confessed she put it there, but could give no reason for doing so, and did not seem to feel sorry nor ashamed of having done so. Without adult supervision, small children are no longer safe in Susan's presence; when left alone with them momentarily, Susan administers sound spankings to all indiscriminately, even though she played happily with them in the presence of an adult. Susan often catches flies, pulls off their wings, and then delights in watching them run about helplessly.

In appearance Susan is a sweet, lovable child. She is small and looks delicate, although her health is excellent. She began school at five, and did very satisfactory work in the first grade. All the members of Susan's family are cultured, and refined; their attitude toward Susan has always been gentle. Susan was never spanked until she spanked one of her little playmates.

Queries. How would you explain Susan's tendencies, and what would you suggest as the best line of remedial procedure?

4. *School truancy*

The case. Mr. B. is a successful farmer, and Mrs. B. is a successful teacher; they have three robust boys. Mrs. B. has continued to teach after her marriage, except for short leaves when her children were very small. Mr. B. is well able to support his family comfortably, but Mrs. B. says she wants to give her boys the best opportunities, and above all things she wants to give them a college education. She is planning to continue teaching as long as possible. When her children were two years old she would take them to school with her, provide them with toys and a small cot in a corner of her classroom, and keep them within her sight all day long. The children entered school at four years of age — to relieve the mother from further care. Mrs. B. does most of her housework, besides teaching school. She is extremely nervous, and demands that her children be very quiet in the evenings so that she will be able to relax. Her boys are now eight, ten, and twelve years old, and are often guilty of truancy. The mother complains that they have no personalities, and are so listless in comparison with her own tireless energy and enthusiasm. She is not worried, only disgusted, over the boys' truancy.

The two older children are described by their teacher as being of

average intelligence, dutiful, and obedient, but extremely shy and of depressed, almost "sad," disposition. They have confided to their teacher that the day the second brother is old enough to quit school, they are going to run away to some Western ranch; two years later, they will come back for their younger brother, and then they will all live in the West.

Queries. Is Mrs. B. giving her children the "best opportunities"? Can you explain the children's personalities? Could you control the situation, what would you advise?

SELECTED REFERENCES

1. Barnett, Mary. *Young Delinquents: A Study of Reformatory and Industrial Schools.* E. P. Dutton and Company, 1913.
2. Breckinridge, S. P., and Abbott, E. *The Delinquent Child and the Home.* Russell Sage Foundation, New York, 1912.
3. Bronner, Augusta. *A Comparative Study of the Intelligence of Delinquent Girls* (thesis). Columbia University Press, 1914.
4. Conyngton, Mary. *Relation Between Occupation and Criminality of Women.* Vol. 15 of *Report on Woman and Child Wage-Earners in the United States.* Washington, Government Printing Office.
5. Fenton, Frances. *The Influence of Newspaper Presentations upon the Growth of Crime* (thesis). University of Chicago Press, 1911.
6. Goddard, H. H. *Juvenile Delinquency.* Dodd, Mead, and Company, 1921.
7. Healy, Wm. *The Individual Delinquent.* Little, Brown, and Company, 1915.
8. Healy, W. *Honesty: A Study of the Causes and Treatment of Dishonesty Among Children.* Childhood and Youth Series, Bobbs-Merrill Company, 1915.
9. Holmes, Arthur. "Can Impacted Teeth Cause Delinquency?" in *Psychological Clinic*, March, 1910, p. 19.
10. Morrison, W. D. *Juvenile Offenders.* D. Appleton and Company, 1900.
11. Murchison, Carl. *Criminal Intelligence.* Clark University Press, 1926.
12. North, C. H. "Insanity Among Adolescent Criminals"; in *American Journal of Insanity*, April, 1911.
13. Sylvester, R. *The Physical Bases of Crime.* Bulletin, American Academy of Medicine, December, 1913.

CHAPTER XVI

OTHER TYPES OF EXCEPTIONAL CHILDREN

1. *The epileptic child*

THE term *epilepsy* designates a large variety of conditions which in general are characterized by sudden and relatively transient "attacks," and involving a disturbance of consciousness and a convulsion of the voluntary and the involuntary musculatures. Explosive attacks without muscular convulsions may occur under a wide variety of conditions not definitely epileptic, but in states that are referred to as borderland conditions.

The main epilepsies are often grouped into two general classes — the late epilepsies which occur relatively late in life, and are dependent upon toxemias and gross organic changes; and the early epilepsies which occur, as a rule, either before or during adolescence. It is the latter group that we are interested in at present.

Etiology. Defective heredity is the most frequent antecedent of epilepsy; it appeared in 87 per cent of the cases where a complete family history was obtained, and existed in 25 per cent of the parents of the cases studied.¹ Davenport and Weeks² show that epilepsy and feeble-mindedness show a great similarity of behavior in heredity, and support the hypothesis that each is due to the absence of a protoplasmic factor that determines complete nervous development. They found that two feeble-minded parents may produce

¹ Diefendorf, A. R. *Clinical Psychiatry; Adapted from Emil Kraepelin*, p. 330. The Macmillan Company, 1915.

² Davenport, C. B., and Weeks, D. F. "A First Study of Inheritance in Epilepsy"; in *The Journal of Nervous and Mental Disease*, vol. 38, no. 11, pp. 641-70.

a large proportion of epileptic children. It is commonly thought that parental alcoholism often is a powerful influence in the causation of epilepsy in children. One study found that in 23.7 per cent of the cases, one or both parents had been addicted to the use of alcohol. In 34 per cent of the cases convulsions appeared in infancy. In childhood and later life convulsions resulted from acute diseases, mental shocks, fright, lesions of nerves, carious teeth, foreign bodies in the ear, or even sexual intercourse. The variety of these causes indicates that instead of being the actual cause they are really excitants bringing on convulsions.¹

Head injuries are often given as the cause of epilepsy, and in some cases this seems to be the actual cause.

Age at onset. Often epilepsy makes its first appearance during the adolescent period. In other cases it appears later, often during senility. In 1400 cases investigated by Gowers,² the onset of epilepsy was found to occur as follows:

28.9	per cent, under 10 years.
45.9	per cent, from 10 to 20 years.
15	per cent, from 20 to 30 years.
9	per cent, from 30 to 60 years.
.34	per cent, after 60.

Pathology. The exact nature of the pathological condition of the epileptic is not known. Gross lesions and anatomical changes have been found in the brain of epileptic subjects. The most important of these changes are an increase of the neuroglia tissue (supporting tissue), especially in the superficial layers of the cortex. In the case of senile epilepsy it seems fairly certain that deterioration depends upon a general and profound disease of the cortex. The morbid condition of the nervous tissue is the ultimate and characteristic cause of the symptoms of epilepsy.

¹ Diefendorf, *op. cit.*, p. 331.

² See Diefendorf, *op. cit.*, p. 331.

Heredity and epilepsy. Davenport and Weeks's study of the inheritance of epilepsy includes the following significant points among the summary findings:

1. When both parents are either epileptic or feeble-minded, all their offspring are so likewise.
2. The conditions known as migraine, chorea, paralysis, and extreme nervousness behave as though due to a simplex condition of the protoplasmic factor that conditions complete nervous development; that is, persons belonging to these classes usually carry some wholly defective germ cells. Such persons may be called "tainted."
3. When such a tainted individual is mated to a defective, about one half of the offspring are defective.
4. When a simplex normal is mated with a defective, about half of the offspring are normal; the others defective or neurotic.
5. When both parents are simplex in nervous development and "tainted," about one quarter of the offspring are defective.
6. The proportion of tainted offspring is not noticeably higher when both parents show the same nervous defect.
7. Normal parents that have epileptic offspring usually show gross nervous defect in their close relatives.
8. There is evidence that in epileptic strains the proportion of epileptic children in the latest complete generation is double that of the preceding, but there is no evidence that in these epileptic strains the average number of children in a fraternity is greater than in the population at large. Thus, if no additional restraint is imposed in the mating, the proportion of epileptics... would double every thirty years.

The progenitors and relatives of epileptics report extreme frequency of headaches, migraine, infantile convulsions, mental disturbances, and deterioration.

Intellect. Occasionally, but not often, epileptics have great intellectual ability. Cæsar, Napoleon, and Flaubert attained great intellectual prominence, and were epileptic. Charles and Mary Lamb were subject to recurrent and severe attacks of this malady. Other epileptics, though not of such illustrious eminence, have held positions requiring

intelligence and judgment. These are all exceptional cases, however.

As a rule, intellectual inferiority characterizes the epileptic. Sometimes this mental inferiority is congenital; in other cases it is acquired as a result of the malady. In the majority of cases the degree of mental deterioration, when once established, remains without marked progress for years or even life. In a few cases complete dementia develops.

Personality traits. Narrowness of the mental horizon, with limited ideation and imperfect association of ideas, is characteristic of the epileptic. Conversation and writing are characterized by great detail and circumstantiality. The subject's vocabulary may be marked by a predominance of set phrases, platitudes, proverbs, and the like. Irrelevant or unessential data often impede the progress of their narratives, but the connections are not lost and the intended points are brought out by circuitous routes.

A great prominence of self is manifested by indulgence of praise of self and family, and great attention is given to personal matters. Another striking symptom of many subjects of marked epilepsy is the large amount of time spent in reading the Bible, prayer or hymn books, and in praying. In the more severe cases memory and judgment are impaired. Even though the intellect may be preserved, the finer feelings generally are blunted, and, as a rule, a rather uniform state of emotional indifference exists. A great variation of emotions are often shown.

Jelliffe and White,¹ in describing the epileptic, say of him:

[he is] apt to be morose, irritable, suspicious, and hypochondriacal. He is quite characteristically unreliable, and with it all frequently presents a very aggressive form of sentimental, shallow religiosity. ... [He] is very sensitive, irritable, and insincere. He is ego-centric

¹ Jelliffe, S. E., and White, W. A. *Diseases of the Nervous System*, p. 997. Fifth edition, Lea and Febiger, Philadelphia, 1929.

to a very considerable degree, paying great attention to himself, his own feelings, his state of health, his physical comforts, and his immediate surroundings.

Epileptics are usually lazy, often lie openly and assume the attitude of the highest moral standards, which are readily discarded when they think they are unobserved. Their physical health is usually good, and their appetites are often ravenous. Passing attacks of transitory ill-humor, occurring between seizures in about 78 per cent of the cases, are characterized by irritability and unreasonableness, and at times associated with delusions and hallucinations.

There are good-natured and well-disposed epileptics, but they are rarely encountered in comparison with the types that are real problem cases.

The epileptic's sexuality is developed but little beyond the infantile stage, but the sexual feelings are very prominent, and are stimulated in many ways, especially by masturbation, homosexuality, and exhibition.

Voice. Scripture and Clark¹ found a characteristic and readily recognized epileptic voice in 75 per cent of their epileptic studies. Kymographic records of the sound waves of the epileptic voices showed the vowel sounds to run along on an even tone, called a "plateau speech." In normal individuals each vowel has a rising and falling melody.

Epileptic seizures.² There are two general types of epileptic attacks, the major or *grand mal*, and the minor or *petit mal*. The grand mal attack is sudden in its onset. The patient falls, and a tonic spasm with unconsciousness develops immediately. In a few moments convulsive spasms replace the tonic; these spasms subside gradually.

¹ Scripture and Clark. "Researches on the Epileptic Voice"; in *Proc. New York Neurol. Soc.*, November 12, 1907.

² This and the remainder of the discussion follows Jelliffe and White, quite closely.

Then, often a short period of automatic activity takes place, followed by a gradual return to full consciousness, or the patient lapses at once into a deep sleep from which he awakes complaining of lameness and weakness in the muscles that were convulsed, and sometimes a headache. These are the general characteristics, and in detail they are different in practically each case, but in each patient the type tends to remain the same.

The *grand mal* attacks are often preceded by a warning, called aura, which may be sensory, motor, or psychic. The sensory types may occur in any of the sensory fields. When occurring in the visual fields, the aura takes the form of flashes of light — hallucinations; in the olfactory field, odors, usually bad ones, are experienced; in the auditory field, the aura may take the form of simple sounds or hallucinatory voices; in the tactual field, simple tactual sensations or hallucinatory hand-grips upon arm or shoulder, etc. An epigastric aura, consisting of a great variety of disagreeable sensations, is the most common.

The direction of the patient's fall at the beginning of the seizure depends upon which muscles are affected first. All the voluntary muscles are affected within a few moments, including the muscles of respiration and the jaw muscles, which results in biting the tongue. Frothy, bloody (from biting tongue) saliva is issued from the mouth when the spasms become convulsive. Frequently urine is passed, and occasionally feces.

During the *petit mal* seizures the convulsions are much milder, often even escaping detection entirely, and the disturbance of consciousness is of much shorter duration and is less profound. During the typical *petit mal* seizure the patient may blanch, falter in what he is doing, become confused for a few moments, fumble with his clothing in a dazed manner for a few moments, and then continue with his af-

fairs as if nothing had happened. An aura also often precedes a petit mal seizure.

Psychic disturbances associated with seizures. A great many psychic disturbances are associated with the epileptic seizures. In many cases a marked disturbance, sometimes of several days' duration, precedes a spasm. The patient's associates recognize it as the sign of an impending attack. Characteristics of this change are increased irritability, complaining, depression or dullness, and hallucinations. The attack relieves these psychic disturbances. The patient is often temporarily confused after an attack. He may rise clumsily, look about himself in a dazed manner, and often begins to engage in some semi-automatic act, such as taking off his clothes.

A condition of active excitement, epileptic furor, may occur just before or, more commonly, after the convulsion. The patient may be in a state of frenzy, and act like a wild man. Although this state is usually brief, and the patient's efforts are diffuse and incoherent, he still may kill any one who approaches, or even kill himself.

Psychic epilepsy. Mental disturbance may substitute convulsions, and may thus become the epileptic equivalent. Such an attack is referred to as psychic epilepsy, and often takes the form of epileptic automatism or epileptic dream state. Such a state may also be associated with a slight seizure that passes unnoticed. As a rule the attacks are of short duration, but they may last for several days. Upon recovery, the patient is not able to recall his acts, or even crimes that he may have perpetrated during the attack. Crimes committed during this condition are characterized by their brutality.

Often transitory conditions of depression, excitement, confusion, delirium, and stupor develop. A condition of ecstasy, with hallucinations, is characteristic. Heaven's

gates ajar, bands of angels, and the voice of God in direct address are common hallucinations.

Jacksonian epilepsy. A type of epileptic seizure caused by a localized cortical lesion produces a convulsion in certain groups of muscles, but consciousness is retained. This type of seizure, known as the Jacksonian type, involves no defect of biological adjustment. A group of muscles has been severed from higher associational levels and has been reduced to relatively automatic and purposeless reaction. This defect is only partial and is confined to the sensorimotor level; the unaffected part of the individual remains intact. Certain toxic substances, causing cortical lesions, produce the Jacksonian convulsions; when the poisons are removed the seizures cease. This condition has been noted in severe forms of infections, high fevers in children, alcoholic poisoning, uremia, and so forth.

Serial seizures. In addition to the isolated seizures just described there may be serial attacks, in which several attacks follow one another at short intervals until they merge, and unconsciousness becomes continuous. The patient's temperature rises and his life becomes endangered. When death overtakes the epileptic it is usually during a serial seizure.

Treatment during seizures. During a seizure the epileptic must be cared for so that he will not injure himself. If he has fallen, it is well to allow him to remain in the prone position on his back or side, only removing him sufficiently from walls and furniture so that he may not come in contact with them in the throes of the convulsions. A rolled towel end should be inserted between his teeth to prevent biting of the tongue. The clothing about the neck should be loosened so that free breathing is permitted. If the patient vomits he should be rolled to his side, so that aspiration of vomitus will be prevented. In the automatic period following the attack the patient should be watched carefully, but, if possible, no

direct efforts at control should be made since these efforts to help are not understood by the patient, and may arouse antagonism.

Before the patient is permitted to arise there must be an assurance of no broken bones occasioned by the fall, for in the automatic state the patient's consciousness is so reduced that pain is not felt and he may readily walk on a broken leg.

During a serial attack a physician should be called who will prescribe treatment.

Treatment between attacks. The treatment of patients between attacks must also be directed by a physician, since the large variety of causes of the malady require individual treatment.

As a rule, epileptics should not be allowed to sleep where they cannot be observed, lest they roll over and smother during an attack.

Interpretation of seizures. Jelliffe and White show that, from a psychological point of view, the seizures may be regarded as a flight into unconsciousness during times of stress, as an emotional crisis or a developmental crisis, such as puberty, which demands new adjustments. The seizure, then, is an attempt at escape from an intolerable condition from within (toxin, tumor) or from some external life situation. The subject reacts at a low instinctive level as he emerges from an attack. At first his respiration is of the infantile type (distinctly abdominal), he makes characteristic sucking movements with his lips, he often passes urine, he fumbles aimlessly with his clothes as he tries to readjust himself to reality, and sometimes he lapses into baby talk. The epileptic's extreme ego-centricity and his inability to make proper adjustments to his environment may be a tendency to withdraw from reality and to revert to earlier ways of obtaining attention.

Prognosis. Prognosis is essentially dependent upon the

cause of the condition and the time of onset. When dependent upon gross brain lesion, recovery is impossible. Mental weakness is progressive to complete deterioration. When caused by head injuries, recoveries have been made, and in many cases decided and long-continued improvement has resulted.

Genuine epilepsy may disappear spontaneously, although recurrence late in life is common. Some mental dullness with transient ill-humor usually is common. The outlook for epilepsy arising early in life is more hopeful than for that arising late in life, when it is very unfavorable. Severe cases must be sent to institutions.

Scholastic training for epileptics. The course of study for the epileptic must be suited to the intellectual status of the subject, as well as to the severity of the patient's affliction and to the vocational fields open to epileptics. Epileptics must not be permitted to operate machinery, or to participate in any kind of work in which a sudden loss of consciousness may endanger their own lives or that of others. Occupations demanding an appearance before groups are likewise not open to epileptics. Outdoor life or work utilizing the larger muscles, rather than the fine coördination of the smaller muscles, is more suited for these subjects. A quiet life, free from worry and excitement, with wholesome interests, and plenty of occupation, is the best treatment that can be provided.

Epileptic children should be taught in special classes for their own sakes, as well as out of consideration for other children. The mortification experienced after a seizure, and the subsequent fear of another, disturbs a child greatly.

2. *The hysterical child*

Hysteria is a functional disease resulting from nervous instability; it is not a disease in the traditional sense, but is

a special type of anomalous behavior. Rosanoff¹ describes it as being essentially a "mere simulation or assumption of disease or disability, without organic basis."

Symptoms. Hysteria is manifested in lessened mental control, instability of emotional control, abnormal suggestibility, excessive day-dreaming, and a tendency to remove unpleasant emotional experiences. Often the attempt to eradicate unpleasant experiences is carried to the extent that a sort of dissociated personality is formed.

The patient may simulate any type of behavior that it is possible for him to produce consciously or unconsciously. For this reason, manifold and complex symptoms may appear in many combinations. They may be mental, physical, or both. Some of the disabilities assumed most commonly are convulsions, fainting attacks, amnesia, blindness, deafness, mutism, paralyses, contractures of muscles, tremors, areas of hypo-aesthesia or anaesthesia, and so on.

Modifications of physiological processes that cannot be controlled by the will, such as rise in temperature, muscular atrophy, pupillary reflexes, and knee-jerk reflex, cannot be simulated by the hysterical subject.

Heredity. Of 100 cases of hysteria observed in soldiers during the World War, Rosanoff² found a neuropathic family history in 64, a negative family history as regards neuropathic conditions in 35, and data unascertained in the remaining case. A history of social maladjustment in some form prior to enlistment was found in 51 cases, a negative history in regard to social adjustment in 47 cases, and an unascertained history in 2 cases. As evidence of neuropathic heredity such cases as epilepsy, criminalism, eccentricities, temperamental anomalies, and nervous breakdown were

¹ Rosanoff, A. J. *Manual of Psychiatry*, chap. vi. John Wiley and Sons, sixth edition, 1927.

² Rosanoff, *op. cit.*, p. 167.

counted when occurring in the family. Poor progress in school, poor showing in work, intemperance, criminalism, and so on, were counted as evidence of social maladjustment. In 77 out of the 100 cases, Rosanoff found that there was either a neuropathic family history or a history of social maladjustment in the individual, or both. From this he concluded that the hysterical phenomena arises on a basis of a neuropathic constitution.

Etiology other than heredity. There are no known physical factors that of themselves cause hysteria. Rosanoff considers the main factor of hysterical conduct to consist in a concealed, illicit, ethically untenable motive. In speaking of this factor with special reference to his war experience, he says:

The motive is not always the same, but it is always characterized by the above-mentioned qualities. Its most frequent variations are: (1) To evade the law of conscription. (2) To procure, upon reporting for physical examination at a training camp, rejection for physical unfitness. (3) To evade dangerous, disagreeable, or difficult duty, or to evade all duty. (4) To procure the ease and privileges of hospital care. (5) To procure discharge on certificate of disability. (6) To procure compensation for disability.¹

As evidence that it was the illicit motive and not shell concussion, war strain, or emotional shock that actuated hysteria, Rosanoff points out three significant groups of facts. First, cases of hysteria arose in domestic training camps, thousands of miles away from the seat of the war. These cases often developed on the day of reporting for military duty, and more often early in the course of training before any war strain could have been effected. Second, it was noted that scarcely any cases of hysteria developed among prisoners of war, who also had been subjected to strain and exposed to shell fire. Third, quick and complete

¹ Rosanoff, *op. cit.*, p. 168.

recovery from hysterical symptoms followed evacuation to a base hospital, and a return of the symptoms developed with the possibility of being sent again to duty.

In times of peace the same general factor — a concealed, illicit, ethically untenable motive — is probably the cause for hysteria. The concealed sex motive stressed by Freud comprise some of the motives, as well as a variety of others. As a rule, children's motives are more readily discovered than are those of adults. A child who disliked her music lessons very much developed a stiff finger, so that it was not possible for her to practice. Another child fainted very frequently in a particular teacher's classroom; the child found the solicitous attention and care given by the teacher because of these attacks to be desirable. A child who had many dislikes in foods vomited and developed a headache each time her mother succeeded in making the child eat some food she did not wish to eat.

The hysterical personality. Rosanoff¹ claims that the essential feature of the hysterical personality is a character defect. That is, he explains, the motivating principle that actuates the hysterical conduct is one of *imposed ethics*. Actuated by this principle he has no æsthetic aversion to unethical behavior.

His preoccupation is mainly how to escape detection, conviction, and punishment. If he refrains from anti-social acts, it is only when the risk involved is too great and too immediate.... This places the hysterical individual in close relation to the criminal. Therein I believe my conception to be correct. Yet a certain difference may be pointed out. Most hysterics are characterized by a trait which is foreign to many criminals: indolence.

Rosanoff proceeds to point out that these patients show a characteristic desire to lead a parasitic existence — to be a burden on relatives, employers, or the government, and to

¹ Rosanoff, *op. cit.*, p. 177.

live on a pension and not to work. Often they steal anything that is convenient; they lie, cheat, and make work and trouble for others, but they do not have the enterprise or energy to plan and carry out a crime that requires work.

Lest this description seem overdrawn, attention was called to the fact that the traits described may exist in all degrees.

Prevalence. Hysterical elements of personality are present in the general population and, perhaps, in quantities conforming to the normal curve of distribution. In most individuals they exist in latent form, and become manifest only under special conditions. Thus, one study¹ of the number of individuals claiming disability in three railway accidents, occurring on one of the large English railway systems between the years 1915 and 1922, found the following data:

Total number of passengers traveling.....	949
Number killed.....	14
Number who sustained physical injury.....	84
Number escaping demonstrable physical injury.....	851
Among these last, number claiming compensation for shock, neurasthenia, etc.....	583

From these figures it was pointed out that 68.5 per cent of an unselected group of people in England developed nervous disability without organic basis on the tempting occasion of a railroad accident and they accordingly put in a claim for compensation.

In the absence of any adequate means, this may be used as a rough means to measure the prevalence of the hysterical element of personality.

Age at onset. Hysteria as a rule does not develop until middle to late adolescence, but the earlier years of a child's

¹ Wilson, S. A. Kinnier. "Rôle of Trauma in the Etiology of Organic and Functional Nervous Diseases"; in *Journal of American Medical Association*, December 29, 1923. Quoted by Rosanoff, *op. cit.*, p. 178.

life are very important in predisposing the individual to this malady. Epidemics of hysterical origin due to psychic contagion have been reported to have taken place among school children.

In many individuals, definite hysterical behavior does not manifest itself until the individuals are thwarted in their wishes or efforts.

Treatment. A large number of methods of treatment have been advocated as being effective cures for hysteria. Rest, work, massage, electricity, chloroform anæsthesia (for psychic deafness and psychic mutism), hypnosis, vocal exercises, and psychoanalysis are but a few of the factors suggested in remedial procedure. Rosanoff holds that the particular method of therapy is of little importance as long as it involves one or more of the following factors:

1. An attitude on the part of (those in charge) of impressing patients in such a way as to preclude any hopes of successful imposition.
2. Demonstration of the unreal nature of the disability.
3. Strict discipline as opposed to sympathy, coddling, or humoring.
4. Painful or otherwise disagreeable features of treatment.
5. Removal of motive actuating the symptoms, by change in situation.

The first factor is very important in the case of epidemics of hysteria among school children. In the army, "nervous seizures" diminished when the rumor spread that the seizures were not in good repute and were regarded with disfavor by medical officers.

A method involving the second factor is desirable in order to demonstrate to the subject that his disability is not real. When an anæsthetic is administered so that loss of consciousness is slight, the patient can be made to realize that he is speaking, hearing, moving, and the like.

The third factor — strict discipline — is very important. Coddling, petting, or attention of any kind is often what the patient wants. Some disagreeable features in the treatment of hysterics often are potent in effecting speedy cures. Thus, in the case of the child who could not eat any of a large variety of foods she did not wish to eat without vomiting, the physician prescribed a diet from which many of her favorite foods were eliminated. In a very short time the child was able to eat any food without any ill effects. In the case of adults, a method involving painful, though not harmful, electrical treatments, was found to have far more cures than a method involving rest and the best of care.

Removal of motives actuating symptoms is the most effective and the most significant factor in establishing cures. The signing of the Armistice was followed by an outbreak of spontaneous cures of hysteria among soldiers. Substituting desirable motives in place of the undesirable ones is often the quickest and surest way of effecting cures. Thus, children who have simulated epileptic attacks in order to obtain attention in the schoolroom have overcome such tendencies when they realized that they could obtain attention by excelling in some line of academic or athletic work.

Just as the origin of hysteria is psychic rather than organic, so the treatment must be in the form of mental hygiene rather than only physical regulation. The teacher is, perhaps, in the best position to direct remedial procedure in the case of children. Plenty of wholesome objective interests must be provided so that the patient has no occasion for reflection or introspection, and plenty of physical activity should be provided so that sheer enjoyment of this activity will preclude the desire for ailments. Pity, sympathy, and attention — the usual objectives sought by ruse — should be avoided, and measures whereby the patient is adroitly interested in other people and things should be sup-

planted. Procedure must be directed through suggestion. Scolding or unsympathetic indifference intensifies the ailments of the hysterical patient.

Epidemics of hysteria among school children. The suggestibility of children in school is observed frequently. One child's interest in a particular undertaking is sufficient to arouse similar interest in other children; the misdemeanors of one child often lead to misdemeanors in other children. Similarly, children showing hysterical characteristics in the schoolroom have caused regular epidemics of hysteria among their classmates.

In one instance a twelve-year-old girl had an attack of hysterics while in a classroom, was carried from the room, and the teacher threw water into her face. Soon several other girls in the class showed the same hysterical symptoms, and had to receive the same treatment.¹

One of the earliest reported hysteric epidemics among school children occurred in Germany, in 1892.² On the 28th of June a ten-year-old girl suddenly began to tremble in her right hand, and then gradually in the whole body. This trembling subsided in about half an hour, without any further complications. On the following day several other girls showed the same trembling, which lasted from half an hour to an hour. Each day the trembling returned and lasted longer and longer, soon interfering with school work, for the affected girls were not able to write. Early in July, one of the trembling girls was attacked with convulsions, and fell under the seat. Even though this case was removed from the classroom immediately, several new cases of convulsions soon appeared among the healthy girls, and by the

¹ Small, M. H. "The Suggestibility of Children"; in *Pedagogical Seminary*, vol. 4, pp. 176-220.

² "Psychische Epidemie in einer Mädchenschule"; in *Zeitschrift für Schulgesundheitspflege*, vol. 5, pp. 556-57. (1892.)

19th of July, twenty children had succumbed to hysterical attacks. During the third week of July, patients having convulsions of the whole body were to be found on almost every seat, and many girls fell under the seats and had to be carried from the room by the boys. These attacks would continue for different periods of time, varying from a quarter of an hour to an hour, and then the trembling would gradually cease. One interesting point was that eight of the girls lost consciousness during the attacks, and upon regaining consciousness knew absolutely nothing of what had occurred. The summer vacation, opening the latter part of July, brought the epidemic to an end provisionally. Thirty-eight girls had already been excused from instruction before the close of the school year. When the school reopened, on August 19th, all the children returned and there was no trembling, although several children complained of severe headaches. After an autumn vacation the normal joy and interest in school work had returned in the cases of all the affected pupils.

Another epidemic of hysteria was reported in Chemnitz.¹ A tremor in the handwriting of two pupils was manifested one day, and in a few weeks there were twenty-one children showing the same disorder. The tremor seemed to affect the children only in their writing. During the first days of the disorder they would begin to write well, but soon would have the tremor. Gradually the trembling began at the beginning of the writing period, and persisted. Grotesque writing forms were made, and the numbers written during the arithmetic period showed exaggerated characteristics of the tremor. In other school work involving arm-and-hand movements there was no occurrence of the trembling. Gymnastic exercises and manual-training work were carried

¹ Schoedel, J. "Ueber induzierte Krankheiten"; in *Jahrbuch für Kinderheilkunde*, vol. 14, pp. 521-28. (1906.)

out without inconvenience or signs of nervousness or of strain.

The school physician cured the first sixteen children in eight days by treatments of a strong electrical current and wholesome suggestion. Severe exercise in mental arithmetic was substituted in place of the writing hour. At the opening of each hour of drill in arithmetic the children were told: "Since you are unable to write, unfortunately you must have mental arithmetic again." Needless to say, permanent cures were established in a short time.

A similar epidemic was reported in a girls' school in Basel, in 1893.¹ An hysterical tremor attacked the weaker and more nervous children, and spread by psychic contagion until it finally appeared among children who previously had been healthy. When one child had an attack the others had one also. A careful study of the epidemic showed that the desire to get rid of school work seemed to be an important factor in bringing on the disorder. The attacks decreased during vacation, and recurred after vacation. When the children were kept at home the attacks ceased altogether, but there was often a recurrence of them when the children returned to school.

Ten years later a similar epidemic of nervous convulsions broke out in the same school, and continued for four weeks. Girls from eleven to fifteen years of age, in fourteen different classes, were affected with a quick vibrating tremor, usually in the right hand and in the right forearm. Many of the patients were anæmic or of nervous dispositions, but in many cases the girls' physical conditions had been normal. Imitation or autosuggestion were the immediate causes for bringing on the tremors. The desire to evade school work was an underlying cause. A rumor that there would be a six-weeks summer vacation because the tremors had broken out

¹ *Pedagogical Seminary*, vol. 17, pp. 524-33. (1910.)

in the girls' school was circulated among the pupils of one building, while in another the rumor was that there would be six weeks of summer vacation if 300 pupils had the tremors. After two children had been sent home because of the severity of the tremors, it became necessary to send twenty-five other cases to their homes. Then a new method of treating the patients was instituted. Instead of sending the children to their homes or closing the school, it was announced that school would continue as usual and that the contraction of the tremors would not excuse any one from school work. The afflicted girls were placed in a special class, and instructed separately from the other pupils. The instruction given this group covered all the main branches of the curriculum, and special care was taken that the work-hours were short, that a wholesome lunch was provided, and that sufficient exercise was taken. Under this arrangement there were only four absences out of 444 half-days, and only one absence for illness.

Remedial procedure for epidemics of hysteria. Suggestion and imitation seem to be the cause for epidemics of hysterical nature among school children. While an epidemic usually begins with the weaker and more nervous children, it soon spreads among normal children. Often the desire to avoid school work or to attract attention is involved. In combating epidemics of hysteria, cures can be made by sending the children home where they will not have the example of the symptoms before them, and where they will obtain what they may have wanted — freedom from school work. However, this method of procedure interferes with the child's school progress, and often is the cause for later epidemics. Suggestions for desirable activities and for an inhibition of hysterical symptoms, coupled with treatment that brings the child to a realization that his afflictions are of no value to him, may suffice in checking an epidemic.

When the attention of the children cannot be directed toward wholesome activity, it may be necessary for the children to be placed in a special class and to enlist the coöperation of the children in effecting cures.

3. *The backward child*

A child over-age for his grade placement, yet testing normal on an intelligence test, is classified as a retarded or a backward child. A retarded child's work may be satisfactory or even superior, since he is older than his classmates, or it may be unsatisfactory.

Frequency. The number of children who are of normal intelligence yet older than they should be for their school grade has been estimated to vary with local conditions from 5 to 75 per cent of the entire school enrollment.¹

Causes. Many factors may operate in retarding a child in his school progress. Among the more prominent are the speaking of a foreign language in the home, entering school at a comparatively advanced age, irregular attendance due to physical defects or weaknesses, inefficient teaching, unsuitable courses of study, and frequent changes of schools attended.

Remedial procedure. A backward child's retardation is not an innate condition, and can be overcome so that the child will be with children of his own age and ability. Remedial procedure must be directed at the cause for the child's retardation. A great number of non-English-speaking immigrant children enter our schools each year. Often the schools make no special efforts to help these children other than to place them in one of the lower grades, no matter what their age or attainments in the schools of their native countries may be, and requiring them to pick up English

¹ Ayres, Leonard. *Laggards in Our Schools*, p. 2. Charities Publication Committee, New York, 1909.

without any special instruction. Special classes in English should be provided for every foreign child. The language handicap is not serious for a child who hears English in school and on the street, and with special training he can soon overcome it; uninstructed he becomes a retarded child.

Backwardness as a result of irregular attendance can be prevented by enforcement of attendance laws when the child is in good physical condition. Attendance is often irregular because of poor health, which in some cases is not so severe but that the child is able to do some work at home. In these cases work can be provided for the child during his absence from school.

Physical defects, such as poor eyesight and defective hearing, are often responsible for retardation. Correction of these defects will prevent retardation from these causes.

When transferring from one school to another a child is often placed in a lower grade; each school likes to think that it is doing work superior to that from which a child is transferred. This cause for retardation is a serious one, since our shifting populations are responsible for many children frequently transferring from one school system to another. A child undoubtedly cannot pick up the work of another school system the first week, before he has had time to adjust himself. The principal and teacher must realize this, and must make especial effort to help the child to proceed in the grade from which he transferred.

Other causes for a child's retardation can usually be remedied by an alert teacher. We must remember that retardation of normal children is a serious situation, and one that demands as careful investigation and correction as any other type of defect in exceptional children.

4. *The undernourished child*

Undernourishment has been defined as "an abnormal or

disordered growth in the development of the tissues and organisms of a child's body, not necessarily synonymous with underfeeding." The statistical side of medical inspection has as yet failed to find satisfactory or definite relations between malnutrition and specific physical defects. It is now admitted that malnutrition is the least understood or the most misunderstood of all the various problems in relation to the physical health of public school children.

Extent of undernourishment. The extent of malnutrition has not been scientifically determined. Medical inspectors differ in regard to the classification of this form of abnormality. A Scotch specialist considered one third of all the school children in Edinburgh as undernourished. In England, Warner and Tuke found 28.5 per cent of London school children suffering from deficient feeding, while estimates for the extent of malnutrition among New York City school children vary from 5 per cent to 40 per cent. Thomas D. Wood regards 25 per cent of the school children in this country as suffering from malnutrition.

Symptoms. The symptoms of undernourishment vary with anæmia, pallor, muscular weakness with spinal curvatures or flatfoot, dark circles under the eyes, harsh and inelastic skins, carious teeth, lassitude, inattention, twitchings, backwardness, diseases of the external eye, and mental sluggishness. Physical measurements, such as height, weight, and chest, are usually below par. There may be an increased susceptibility to infectious diseases, marked liability to tuberculosis, protracted colds and bronchitis, delayed physical and, in extreme cases, mental development.

Causes. Sociological problems are often closely connected with undernourishment. Low wages, underemployment, poor living conditions, alcoholism, and poor personal hygiene may be the indirect causes of undernourishment. Ignorance of food values may be a cause among the better

classes, as well as among the poorer classes. Among better classes as well as among poorer classes, poor assimilation of food or a child's whim in selection of food may be responsible. Worry, grief, or anxiety are often the basis for malnutrition in that they interfere with digestion or limit appetites.

Remedial procedure. The coöperation of a physician, the home, and the teacher is usually required to ascertain the cause for undernourishment. A child may receive good care, live in a happy environment, eat nourishing food, and still be undernourished because of a body condition that fails to assimilate the food. In this case the physician's attention is needed. In many cases insufficient food is provided for the child; sociological agencies are best equipped to remedy this condition. In the majority of cases, the teacher can direct remedial procedure by arousing an interest and a desire in health, and by teaching proper health habits. The child must be taught proper eating habits, a knowledge of food values and food preparation, the importance of rest, fresh air, sunshine, cleanliness, proper clothing, body elimination, exercise, and a cheerful disposition.

5. *The overweight child*

A careful investigation in regard to the comparative psychology and hygiene of the overweight child was made a few years ago.¹ Three groups of eleven-year-old children, comprised of 50 boys and 50 girls each, were so selected that only those who were 15 per cent and over the weight standard for their height and age were included in the overweight group; those within 5 per cent plus or minus were assigned to the normal group; and those who were 8 per cent and below were delegated to the underweight group.

¹ McHale, Kathryn. *Comparative Psychology and Hygiene of the Overweight Child*. Teachers College Contributions to Education, no. 221. Columbia University.

Data were gathered from the parents of these children, and from the children themselves by using questionnaires, intelligence tests, various school achievement tests, and various interests and activities and tests. From these data it was found that body weight had little to do with the possession of certain degrees of intelligence; the differences in intelligence quotients were negligible.

When measured by the Woodworth-Matthews emotional-stability test, the overweight group, both boys and girls, had the greatest tendency to fears and worries. A personal-data questionnaire of 140 questions suggested that there are moral, physical, mental, hygienic, and æsthetic aspects to the problem of body size. The underweight group had the greatest inclination to pains, weariness, and other physical symptoms. The underweight group, as a whole, had the greatest tendency to dreams, phantasies, and other sleep disturbances. More underweight boys and overweight girls pitied themselves than did the other body-weight groups. The overweight children indicated that they feel brave because of body size, and the underweight boys indicated that they often felt weak and incompetent.

In intellectual, social, and activity interests the overweight group was like that of the other groups, with a few exceptions. Associations with their state of body weight were revealed on an association test, in that such words as *eat*, *hungry*, *nicknames*, and the like brought forth responses from the overweight group unlike those for the other groups. The three groups preferred "active social" and "active solitary" to "mildly active" games in regard to play interests, as classified in the Terman classification of play interests.

In general, in so far as the measurements went, the overweight children did not differ from other children, though there were a few differences which were better than chance differences weighting the positive side.

CASE STUDIES

1. *An epileptic child*

The case. John C. was considered "queer" from early childhood. When a baby he often had severe spasms, and later suffered from grand mal epilepsy. One day, when he was about fifteen years of age, John and his brothers went hunting. They had a strenuous day, and did not return until dusk. When the boys alighted from the car, John gazed intently down the street with an awestruck expression. His brothers asked him what he saw.

"Look," said John, "see the band of angels!"

The brothers laughed and said, "There aren't any angels down the street. Take the guns into the house and we'll have supper."

"But I see hundreds of angels coming down the street," John insisted, as he reluctantly began to take the guns from the wagon. A moment later, as he fumblingly gathered up the guns, he caught one of the triggers in some way and discharged a gun. The bullet struck John and killed him instantly.

The people of the small community in which John lived, still tell this incident, twenty years after its occurrence, as an illustration of divine predestination.

Queries. Can you explain John's vision and the accident on other grounds than unrelated coincidence? Was there any reason why John should have a "vision" on that particular day? Was there any reason why he should fumble with the guns?

2. *Hysteria cases*

The case. Patricia is a very nervous child; she has many severe headaches, has a poor appetite, and often complains of being tired. Her mother is neurotic and a semi-invalid. When Patricia was in the fourth grade her father took her to school each morning in a new Marmon car. When his working hours were changed he could no longer take Patricia to school, and she was required to walk a distance of eight blocks. Patricia did not like to walk, and soon complained that the walk made her head ache severely. Her father explained to her that the distance in the morning when she was well rested was no greater than in the afternoon when she was tired, and that she had walked the distance home ever since she began school without getting a headache. One morning, while walking to school, Patricia became very ill and vomited. A woman took the child into her home and called Patricia's father. He came im-

mediately, and Patricia said she was able to go to school if she did not have to walk the rest of the way, for it was the walk that had made her ill. The two following mornings the same vomiting spells overtook her, and each time the father was called. The mother was convinced that Patricia was not able to walk to school, and insisted that some arrangement be made so that the father could take the child to school in the car.

The father took Patricia and her mother to the family physician, who explained carefully that Patricia was well able to walk and that her vomiting was in no way due to her walking and was of no consequence. He advised that Patricia walk to school, and if she vomited she should not be alarmed, but continue her way to school. If the vomiting continued he advised that the child should not eat desserts and candy, for they might be upsetting her stomach. The mother hoped that no permanent injury would result from Patricia's walking.

As Patricia continued to walk to school her vomiting spells decreased, but she was not very happy. The mother inquired each day in regard to the effects of the walk. The father laughed at her and said he knew it was all a matter of the imagination, and that the walk couldn't have anything but beneficial effects.

Soon Patricia confided to her mother that her right leg became very tired from the walk, and asked that the father should not know about it because he would only laugh about it. The mother became quite solicitous about the child's leg. Gradually the knee joint seemed to be growing stiff, and the child walked with a decided limp. The mother, no longer having confidence in the family physician, consulted another physician, without giving him the history of the case. The new physician was quite baffled over the lameness in an apparently healthy child. Soon Patricia's leg became completely paralyzed; it was insensitive to needle pricks, and her leg did not react to the patellar reflex.

Patricia's father is now genuinely alarmed, and has repeatedly expressed regret in requiring Patricia to walk. Patricia is a sweet, patient, little invalid. Her school work is directed by a "home teacher." The child accepts her affliction with fortitude and resignation, and graciously forgives her penitent father. The mother says that the child seems like a different personality in her suffering, "elevated through affliction," and that her magnanimity could well be an object lesson to many people. The father, ashamed of his early negligence, has not told the new physician about it, for it

could not, he is certain, throw any light upon the case anyway. Strangely enough, the mother became well and strong since the child became invalided.

Queries. How would you explain Patricia's case? How do you think the child could be cured of her paralysis?

3. *A backward child*

The case. When Louise was twelve years of age her mother, upon the death of Louise's father, moved from the country to a city. A letter of transfer stated that while Louise did excellent work whenever she attended school, her attendance was so irregular that she had not completed the required work for the fifth grade. It was learned that Louise's parents were hard-working people, and quite opposed to schooling, comfort, and luxury of any kind. Although the family was well-to-do, Louise was obliged to arise very early and work very hard until late at night. Her health was excellent, and she often did a man's work during a busy season on the farm. Her irregular school attendance was due to her parents' insistence that the child work at home. Although Louise had had very little contact with people and very little schooling, her I.Q. was found to be 135. She was eager to go to school, and enjoyed school work very much.

Queries. Would you place Louise in a fifth grade and let her continue at the regular rate? How would you handle her case in a school that had no opportunity rooms?

4. *An undernourished child*

The case. Kathleen is five years of age. She is a delicate, anæmic, listless child, and tall for her age but very thin. She eats very little, refuses to drink milk, and often does no more than nibble at a meal. Kathleen's mother carefully prepares wholesome meals and urges the child to eat. Kathleen has two young aunts who are constantly dieting in order to retain their sylphlike figures. Kathleen's mother often comments about the child's "birdlike appetite," and is worried about the child's delicate health. The family physician has repeatedly told the mother that Kathleen must eat more if she is to grow strong and robust.

Query. How would you proceed in a campaign to induce Kathleen to eat more?

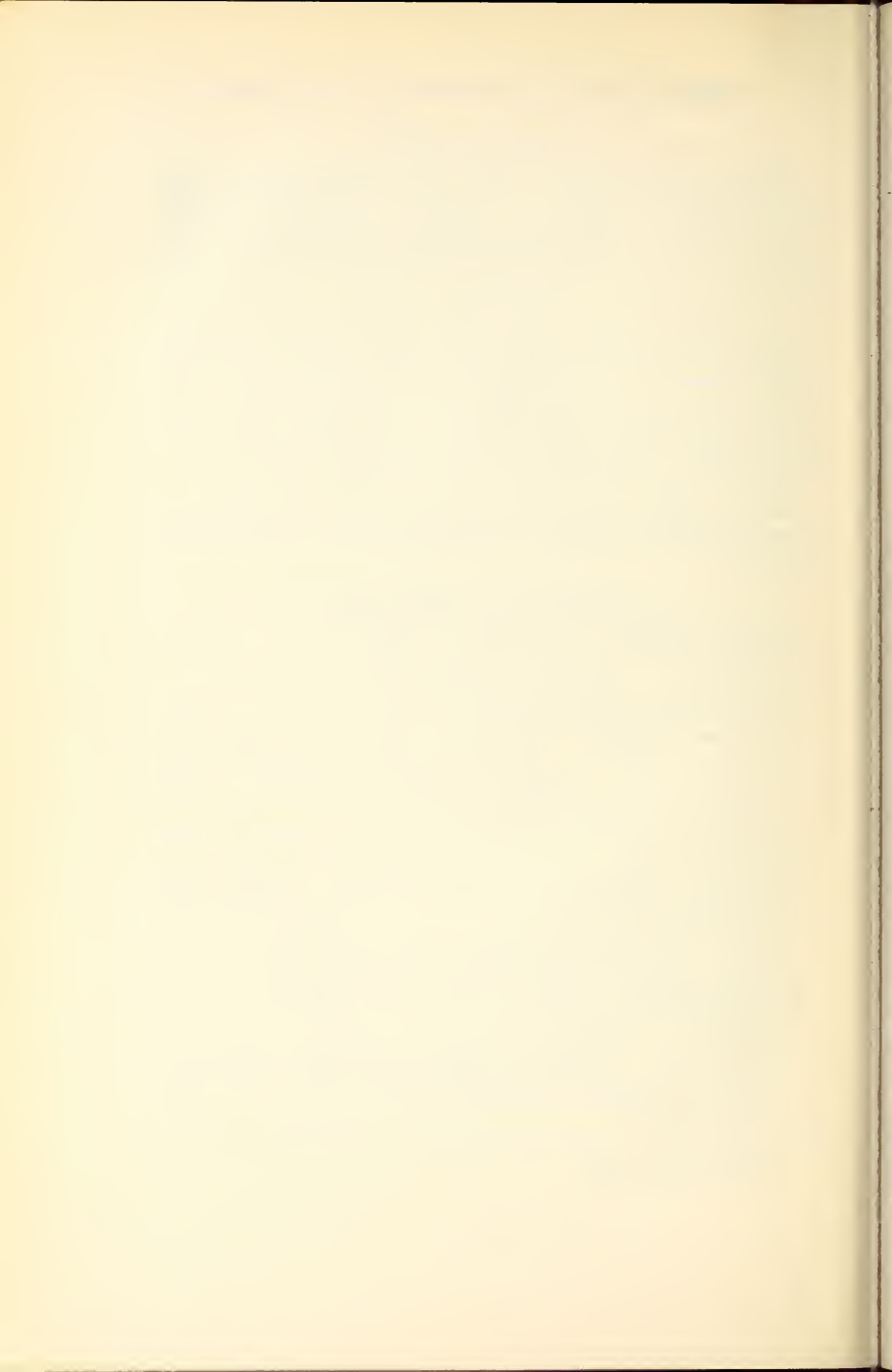
5. *An overweight boy*

The case. Howard, now fourteen years of age, has been overweight from early childhood. His obesity is in part due to a glandular derangement, and in part to his overeating. He is exceedingly fond of sweets; he munches chocolates almost all day long. Often, after a heavy meal, the child will stroll down town to a lunch stand and eat a sandwich and a piece of pie. Howard's mother has tried to put her son on a diet, but he begged so for more food that she could not continue with the diet. She is now interested in a newspaper advertisement that guarantees a reduction of weight without dieting or exercise — two things objectionable to Howard. A few years ago Howard's mother consulted a physician in regard to her son's weight. The physician's directions were never carried out because the mother knew that her son "could never stand it."

Queries. Do you think that Howard's weight will be reduced? If you were Howard's teacher, what would you do about the child's condition?

SELECTED REFERENCES

1. Ayers, Leonard P. *Laggards in Our Schools*. Charities Publication Committee, New York, 1909.
2. Bordeaux, A. "The Overweight Child"; in *Endocrine Survey*, vol. 11, no. 5. (May, 1925.)
3. Burnham, W. H. *The Normal Mind*. D. Appleton and Company, 1925.
4. Conklin, E. S. *Principles of Abnormal Psychology*. Henry Holt and Company, 1927.
5. Diefendorf, A. R. *Clinical Psychiatry*. The Macmillan Company, 1915.
6. Janet, P. *The Major Symptoms of Hysteria*. The Macmillan Company, 1913.
7. Jelliffe, S. E., and White, W. A. *Diseases of the Nervous System*. Fifth edition, Lea and Febiger, Philadelphia, 1929.
8. McDougall, W. *Outline of Abnormal Psychology*. Charles Scribner's Sons, 1926.
9. McHale, K. *Comparative Psychology and Hygiene of the Overweight Child*. Teachers College Contributions to Education, no. 221. Columbia University, 1926. (See also for underweight child.)
10. Rosanoff, A. J. *Manual of Psychiatry*. John Wiley and Sons, sixth edition, 1927.



INDEX

- Accent, foreign, as minor speech defect, 120-23
- Accidents, as cause of deafness, 328; as cause of blindness, 366
- Adults, average level of intelligence in, 39
- Age, mental, 35, 36
- Alcoholism, effects of parental, 18, 19; relation to feeble-mindedness of parent's, 184, 185
- Allen, W. H., *Civics and Health*, 377 n.
- Ambidexterity, left-handedness and, 141
- American Association to Promote the Teaching of Speech to the Deaf, work of, 353-55
- American Encyclopedia of Ophthalmology*, 362 n.
- Americans, intelligence scores of, 52-54
- Amnesia, auditory, as cause of stuttering, 79, 80
- Anderson, F. N., on psychoneurotic child, 291 n.
- Anderson, M. L., summary of training of feeble-minded, 208, 209; *Education of Defectives in the Public Schools*, 208 n.
- Annals of Ophthalmology*, 361 n.
- Arner, G. B. L., *Consanguineous Marriages*, 351 n., 364 n.
- Art, children especially gifted in, 273-79. *See also* Drawing
- Aschaffenburg, G., *Crime and Its Repression*, 437 n.
- Ascham, R., *The Scholemaster*, 430, 430 n.
- Association, in feeble-minded, 192, 193
- Attention, in feeble-minded, 190, 191
- Audiometer, used to test hearing, 336-40
- Ayer, F. C., *The Psychology of Drawing*, 273 n., 278 n.
- Ayers, L. A., criticisms of Binet scale, 42; in *The Psychological Clinic*, 42 n.
- Ayres, L. F., *Laggards in Our Schools*, 495 n.
- Bach, J. S., musical ability in family of, 272, 273
- Backward child. *See* Retardation
- Baldwin, B. T., and Stecher, on constancy of I.Q., 41; *Mental Growth Curve of Normal and Superior Children*, 41 n.; on pubertal development and mental capacity, 449; *Physical Growth and School Progress*, 449 n.
- Baldwin, J. N., on "mirror-writing," 163, 164; *Baldwin's Dictionary of Philosophy and Psychology*, 163 n., 166 n.; explanation of "mirror-writing," 166, 167; *Mental Development in the Child and the Race*, 166 n.
- Ballard, P. B., in *Journal of Experimental Pedagogy*, 98 n., 140 n.; on eyedness and handedness, 140
- Barr Scale, of Occupational Status, 248, 248 n.
- Beeley, A. L., *An Experimental Study in Left-Handedness*, 163, 167 n., 168 n., 169, 169 n., 170, 170 n.; explanation of "mirror-writing," 167, 168; on prevalence of "mirror-writing," 168; study of "mirror-writing" and intelligence, 168-70; on correction of "mirror-writing," 170, 171
- Beethoven, L. van, early evidences of musical talent, 270
- Belden, E., *Courts in the United States Hearing Children's Cases*, 465 n.
- Bell, A. G., founder of *The Volta Review*, 354
- Bell, Mrs. J. W., on work for the deaf, 354 n.
- Best, H., *The Deaf*, 341 n., 349 n., 350 n., 351 n.; *The Blind*, 360 n., 366 n.
- Binet, A., conception of intelligence, 30, 31; development of intelligence scale by, 31; revisions of intelligence scale of, 31-36; on possibility of measuring intelligence, 43; attempt to discover psychoneurosis from test findings, 299
- Binet Intelligence Scale, criticisms of, 41-43; adapted for the blind, 368-71
- Blanton, S., on prevalence of stuttering, 90; in *Journal of Educational Psychology*, 90 n., 91 n.; on sex in relation to stuttering, 91
- Blind child, limited understanding of, 358, 359; early training of, 367, 368; Binet intelligence tests for, 368-71; education of, 371-73; training in reading Braille, 377-83; standardized reading tests adapted for, 383-85; supplementary reading material for, 385; reading ability of, 385, 386; vocational training of, 386, 387; musical ability of, 387; sense acuity of, 387-400; auditory memory of, 387-91; tactual sensibility of, 390-93; perception of, 393-99; case studies of, 400, 401. *See also* Blindness and Vision

- Blindness, proportion of children handicapped by semi-, 7-9; school provision for children handicapped by, 10-12; frequency of cases of, 359; causes of, 359-67; from hereditary causes, 360-64; in relation to hereditary diseases, 361-63; in offspring of consanguineous marriages, 362-64; in relation to general diseases, 364-66; syphilis as cause of, 364 n.; trachoma as cause of, 365, 366; caused by accidents, 366; combined with deafness, 367, 368. *See also* Blind child and Vision
- Bloemel, C. S., theory of cause of stuttering, 79, 80; *Stammering and Cognitive Defects*, 79 n., 91 n.; on sex in relation to stuttering, 91
- Bond, N. J., and Dearborn, study of auditory memory and tactual sensibility of blind children, 387-91; in *Journal of Educational Psychology*, 387 n.
- Book, W. F., *The Intelligence of High School Seniors*, 51 n.
- Borden, R. C., and Busse, *Speech Correction*, 113 n.
- Boston, outcomes of delinquents in, 471
- Braille, type for blind readers, 377-80; mechanics of reading, 380-83; standardized reading tests in, 383-85; supplementary reading material for blind children in, 385; ability of blind children in reading, 385, 386
- Brain, structure of, 63, 64; of feeble-minded individual, 187, 188
- Brainerd, H. G., Brousseau and, on causes of Mongolism, 220, 221; *Mongolism*, 220 n.
- Bridgman, L., example of deafness and blindness combined, 366
- Bridgeman, O., Morrow and, on delinquent girls, 434; in *Training School Bulletin*, 434 n.
- Bridges, J. W., and K. M. B., on school progress of delinquent boys, 460; in *Genetic Psychology Monographs*, 460 n., 461 n., 463 n.; study of emotional stability of delinquent children, 461, 462; study of emotions of delinquents, 463, 464
- Brigham, C. C., *A Study of American Intelligence*, 454 n.
- Broadbent, W., on word-blindness, 404 n.
- Bronner, A. F., on word-blindness, 408 n.
- Bronner, A. F., Healy and, study of types of juvenile delinquency, 452-54; on causes of delinquency, 445-47; on physical condition of delinquent children, 447-50; *Delinquents and Criminals*, 448 n., 449 n., 454 n., 456 n.; on intelligence of delinquent boys, 454; follow-up study of delinquent children, 456-71
- Brousseau, K., and Brainerd, on causes of Mongolism, 220, 221; *Mongolism*, 220 n.
- Brown, M. S., and Stratton, on tactile sensitivity of the blind, 392, 393; in *Journal of Experimental Psychology*, 392 n.
- Brown, W., in *British Journal of Psychology*, 193 n.
- Bunyan, J., *The Pilgrim's Progress*, 181
- Burnette, N. L., in *Vocational Branch Manual*, 161 n.
- Burrows, T., on intelligence of psychoneurotic child, 303; in *Journal of Abnormal Psychology*, 303 n.
- Burt, C., criticism of Binet scale, 42; *Mental and Scholastic Tests*, 42 n., 164 n., 165 n., 406 n.; on word-blindness, 408 n.; *The Young Delinquent*, 431 n.
- Busse, A. C., Borden and, *Speech Correction*, 113 n.
- Byron, Lord, early evidences of poetical ability, 280; on words, 403
- Cesar, as epileptic, 477
- Cameron, H. C., characterization of psychoneurotic child, 303, 304; *The Nervous Child*, 303 n.
- Carelessness, as secondary cause of stuttering, 88, 89; speech defects resulting from, 113-16; as cause of deafness, 328
- Carey, N., in *British Journal of Psychology*, 192 n.
- Carmichael, L., on "mirror-writing," 164-66; case study of "mirror-writing," 171-73; Lord, and Dearborn, *Special Disabilities in Learning to Read and Write*, 164 n., 171 n., 406 n., 416 n., 419 n.
- Carrière, on pre-natal effect of tubercle bacilli, 18
- Catola, on effects of defective nutrition during pregnancy, 18
- Cattell, J. M., on inheritance of superior intelligence, 235; *American Men of Science*, 235 n.; on relation of heredity and environment to superior intelligence, 237, 238
- Cerebellum, structure and functions of, 63, 64
- Cerebrum, structure and functions of, 63-68
- Character, tests for, 252-58
- Characteristics, theory of inheritance of acquired, 14

- Characters, dominant and recessive Mendelian, 23, 24
- Chicago, outcome of delinquents in, 467-70
- Child, concept of normal, 1; neglect of emotional life of, 291
- Children, exceptional. *See* Exceptional children
- Children, gifted. *See* Gifted children
- Children, individual differences in, 2, 3; classification on basis of I.Q.'s, 38
- Chinese, intelligence scores of, 54, 55
- Cities, educational provision for exceptional children in schools of, 9-12; I.Q. of children in country and, 51
- Clark, E. L., *American Men of Letters: Their Nature and Nurture*, 235 n.
- Clark, Scripture and, on the epileptic voice, 479; in *Proc. New York Neurol. Soc.*, 479 n.
- Classes, sight-saving, 373
- Classes, special, for feeble-minded, 206, 208, 209; for gifted children, 261-63; for psychoneurotic children, 309, 310
- Cluttering, as minor speech defect, 116
- Colyer, H., study of hand dominance, 156 n.; Scheidemann and, in *The Journal of Educational Psychology*, 158 n.
- Companionship, delinquency caused by bad, 445
- Condon, R. J., in *Elementary School Journal*, 154 n.
- Conflict, speech, as secondary cause of stuttering, 89
- Conklin, E. G., on Galton's theories of inheritance, 22-28; *Heredity and Environment*, 22 n.
- Conklin, E. S., *Principles of Abnormal Psychology*, 183 n.
- Conradi, E., on prevalence of stuttering, 90; in *Pedagogical Seminary*, 90 n., 91 n.; on sex in relation to stuttering, 91
- Convulsions, as cause of feeble-mindedness, 186
- Coprolalia, in feeble-minded, 205
- Coriat, I. H., theory of cause of stuttering, 80, 81; in *Journal of Abnormal Psychology*, 80 n.
- Cortex, sensory areas of, 64
- Country, I.Q. of children in city and, 51
- Court, delinquent child in juvenile, 465, 466
- Cowper, W., early evidences of poetical ability, 280, 281
- Cox, C. M., on Mozart's early musical progress, 269; *Genetic Studies of Genius*, 269 n., 276 n.
- Crawford, C. C., Tiegs and, *Statistics for Teachers*, 4 n.
- Cretinism, characteristics of, 213, 214; causes of, 214, 215; pathology of, 215; treatment and results, 215, 216
- Criminalism, as psychopathic state, 318-20; psychic anomalies connected with, 319, 320
- Cripples, proportion among school children, 7; school provision for, 10-12
- Cuneo, I., Terman and, in *Pedagogical Seminary*, 306 n.
- Curriculum, enrichment of for gifted children, 261-63
- Curve, normal-frequency, 3-6; probability, 3-6; characteristics of ideal probability, 5; factors affecting frequency, 5
- Cushing, on early prevalence of right-handedness, 140
- Daniels, M. E., on training of deaf child, 332-35; in *Child Welfare*, 332 n.
- Davenport and Laughlin, diagram of hereditary cataract, 361
- Davenport, C. B., in *Science*, 25 n.; *Heredity in Relation to Eugenics*, 351 n.
- Davenport, C. B., and Weeks, on causes of epilepsy, 475, 476; in *The Journal of Nervous and Mental Disease*, 475 n., 476 n.; study of inheritance of epilepsy, 477
- Davenport, C. D., on inheritance of criminalistic traits, 440; *The Feebly Inhibited*, 440 n.
- da Vinci, L., a "mirror-writer," 164; early evidence of artistic talent, 277
- Day, H. E., Fusfeld, and Pintner, *A Survey of American Schools for the Deaf*, 338 n., 343 n., 348 n.
- Deaf, sociological work for and by, 353, 354; achievements and activities of, 354, 355
- Deaf child, mental status of, 329-31; educational status of, 330; methods of teaching, 330; cause for mental inferiority of, 330, 331; training of, 331-36; case study in training, 332-35; fundamental principles in training of, 335, 336; discovery of, 336-41; residual hearing in, 337-41; oral method of training, 341, 343; manual method of training, 341-43; in residential and in day schools, 343-47; nativity of pupils in residential and day schools, 344; sex distribution in residential and day schools, 344; age of losing hearing in pupils of residential and day schools, 344, 345; hearing or deafness of parents in residential and day schools, 345, 346; consanguinity of parents in residential and day schools, 346, 347; increase of

- public day schools for, 347, 348; occupations of graduates of public day schools for, 348; trades learned in school by, 348, 349. *See also* Deafness
- Deafness, proportion of children handicapped by semi-, 7-9; school provision for children handicapped by, 10-12; prevalence of, 327; causes of, 328; treatment of, 328, 329; use of audiometer in testing, 336-40; percentage distribution of common causes of, 348, 349; age of occurrence of, 350; congenital, 350-53; relation of consanguineous parents to congenital, 350, 351; relation of deaf relatives to, 351-53; whisper test for, 355, 356; case studies of, 356, 357; combined with blindness, 367, 368. *See also* Deaf child
- Dearborn, W. F., Lord, Carmichael and, *Special Disabilities in Learning to Read and Write*, 164 n., 171 n., 405 n., 416 n., 419 n.; Bond and, study of auditory memory and tactual sensibility of blind children, 387-91; in *Journal of Educational Psychology*, 387 n.; on training of the word-blind, 419; on special reading disability in relation to left-handedness and left-eyedness, 422-25; in *School and Society*, 422 n.
- Deblity, nervous, as secondary cause of stuttering, 85
- De Candolle, A., *Histoire des sciences et des savants depuis deux siècles*, 235 n.
- Defects, proportion of children handicapped by physical, 7-9
- Degeneration, stigmata of in feeble-minded, 198-201
- Delinquency, definition, 431; causes of, 435-47; relation to heredity, 437-41; relation of broken homes to, 440, 441, 443; theory of moral imbecility in, 441-43; in relation to environment, 443, 444; relation of idleness to, 443, 444; causes of, 444-47; bad companionship as cause of, 445; lack of effect of moving pictures on, 446; effect of pernicious stories on, 446, 447; relation to intelligence, 450-57; religion in relation to, 458, 459; in relation to scholastic achievement, 460; in relation to emotional stability, 460-62; in relation to moral judgment, worries, and interests, 462-64. *See also* Delinquent child
- Delinquent child, proportion among school children, 7, 8; school provision for, 10-12; types of cases and offenses, 430-35; relation of broken home to, 440, 441, 443; physical condition of, 447-50; sex in relation to intelligence of, 456, 457; as psychopath, 464, 465; in juvenile court, 465, 466; success or failure of treatment of, 466-71; relation of sex to outcome of, 467; case studies of outcomes, 467-69; outcomes in relation to offenses committed, 469-71; case studies of different types of, 471-74. *See also* Delinquency
- Diefendorf, A. R., *Clinical Psychiatry*, 475 n.
- Differences, individual, in children, 2, 3; causes of individual, 12; effect of environment on individual, 14-19
- Diseases, feeble-mindedness caused by acute infectious, 186; deafness caused by acute infectious, 328; blindness in relation to hereditary, 361-63; blindness in relation to general, 364-66
- Distribution, normal-frequency curve of, 3-6
- Doll, E. A., in *Training School Bulletin*, 300 n.
- Dominance, theory of handedness dependent on ocular, 132
- Downey, J. E., on eyedness and handedness, 139; in *American Journal of Psychology*, 139 n., 144 n.
- Drawing, characteristics of ability in, 273; objective tests for ability in, 273-75; innateness of ability in, 275-77; age at which ability is shown, 275, 276; correlation between general intelligence and ability in, 278, 279; case study of ability in, 289
- Drummond, W. B., work on intelligence tests for the blind, 368 n.
- Dunlap, K., theory of cause of stuttering, 82; in *Journal of Abnormal Psychology*, 82 n.
- Dürer, A., early evidence of artistic talent, 277
- Ear, stigmata of in feeble-minded, 199-201
- Echolalia, in feeble-minded, 205
- Emerson, R. W., early evidences of poetical ability, 281
- Environment, effect on individual differences, 14-19; pre-natal factors in, 15-19; natal factors in, 15; post-natal factors in, 15; effect of color changes in pre-natal, 17; effect of moisture changes in pre-natal, 17; relation to superior intelligence, 233, 237, 238; delinquency in relation to, 443, 444
- Epilepsy, description, 475; causes of, 475, 476; age at onset, 476; pathology of, 476; relation of heredity to, 477; seizures of, 479-82; psychic disturbances

- associated with seizures of, 481; psych-
chic, 481, 482; Jacksonian, 482; serial
seizures of, 482; treatment during sei-
zures, 482; treatment between attacks,
483; interpretation of seizures, 483;
prognosis in, 483, 484; case study of,
500
- Epileptics, proportion among school chil-
dren, 7, 8; intelligence of, 477, 478;
personality traits of, 478, 479; voice
of, 479; scholastic training for, 484
- Eroticism, form of sexual pathology, 322
- Evans, J., on early prevalence of right-
handedness, 140
- Exceptional children, characteristics
marking, 1, 2; proportion of, 6-9; dis-
tribution of, 7-9; educational provi-
sions for, in city schools, 9-12
- Exhibitionism, in psychopathic children,
322
- Eye, stigmata of, in feeble-minded, 201
- Eye-color, Mendelian theory applied to,
25-27
- Eyedness, relation to handedness, 132-
34; tests for discovering native, 134; in
relation to handedness, 136, 137, 139,
140; prevalence of left-, 138; directions
for testing, 174-77; case study of left-,
178, 179
- Fay, E. A., *Marriages of the Deaf*, 351 n.,
353 n.
- Feeble-minded, proportion of, 7-9; school
provision for, 10; speech defects of, 123;
prevalence of left-handedness among,
153, 154; psychological characteristics
of, 187-95; characteristics of brain in,
187, 188; impairment of senses in, 188,
189; sense of taste in, 188; sense of
smell in, 188; vision in, 188; hearing in,
189; cutaneous senses in, 189; other
sensations in, 189; sexual instincts in,
189; perception in, 190; attention in,
190, 191; imagination in, 192; associa-
tion in, 192, 193; memory in, 193, 194;
reasoning and judgment in, 194; will
in, 194, 195; emotion in, 195; physical
condition of, 196-205; height and
weight of, 196-98; stigmata of degener-
ation in, 198-201; motor ability of, 201,
202; anomalies of movement in, 202;
speech of, 202-04; defects of pronuncia-
tion in, 204; training of, 206-11; objec-
tives of education for, 206-08; special
classes for, 206, 208, 209; technique re-
quired for teaching, 210; age of walking
and talking, 241, 242
- Feeble-mindedness, definitions of, 181-
83; hereditary and acquired, 181-87;
causes of, 183-87; heredity as cause of,
183, 184; acquired before birth, 184,
185; relation of alcoholism, syphilis or
tuberculosis in parent to, 184, 185; re-
lation of abnormal conditions of preg-
nancy to, 185; acquired at birth, 185,
186; post-natal causes of, 186, 187; case
studies of, 210, 211; special types of,
213-30; due to arrested or perverted
development, 213-23, 229; cretinism,
213-16; Mongolism, 216-21; micro-
cephaly, 221-23; acquired forms of,
223-29; hydrocephaly, 223-25; para-
lytics, 225-27; meningitis, 227, 228;
case studies of special types of, 229
- Fenton, J. C., Terman and, in *Journal of
Applied Psychology*, 282 n.
- Fernald, G. M., training of word-blind,
411, 418
- Fernald, M. R., on intelligence of delin-
quents, 455; in *Journal of Criminal
Law and Criminology*, 455 n.
- Ferris, Woolley and, case study of word-
blind child, 407, 408, 417, 418; *Diagno-
sis and Treatment of Young School Fail-
ures*, 407 n.
- Fildes, L. G., study of word-blindness,
408, 409, 416
- Fischlovitz, A., *An Inductive Study of the
Abilities Involved in Drawing*, 278 n.
- Flaubert, G., as epileptic, 477
- Fletcher, J. M., proposals for treatment
of stuttering, 102; *The Problem of Stut-
tering*, 102 n.
- Fluctuations, as type of variation, 19,
20
- Ford, B., early evidences of poetic ability,
282
- Ford, C. A., in *Psychological Clinic*, 306 n.
- Form board, Vineland-Seguin, use for
testing of intelligence, 45, 46
- Franz, S. I., *A Handbook of Mental Ex-
amination Methods*, 461 n.
- Freeman, F. N., *Mental Tests*, 56 n.;
training of word-blind, 411, 418
- Freud, S., theory of cause of stuttering,
80-82; *Psychopathology of Everyday
Life*, 80 n.
- Frigidity, sexual, 322
- Fusfeld, I. S., Day, and Pintner, *A Sur-
vey of American Schools for the Deaf*,
338 n., 343 n., 348 n.
- Galton, F., law of ancestral inheritance,
20-22; law of filial regression, 21, 22;
on inheritance of superior intelligence,
234, 235; *English Men of Science*, 235 n.,
240 n.; on physical development of
men of genius, 240, 241; on gifted chil-

- dren, 263, 264; *Natural Inheritance*, 351 n.
- Gates, A. I., *Psychology for Students of Education*, 4; *The Psychology of Reading and Spelling, with Special Reference to Disability*, 405 n., 414 n.; on word-blindness, 409; on general visual perception of the word-blind, 414-16; on training of word-blind, 418
- Gesell, A., *The Pre-School Child*, 6 n.; study of proportion and distribution of exceptional children, 7; *Exceptional Children in Public School Policy*, 7 n., 232 n.
- Gifted children, proportion of, 8, 9; school provision for, 10; criticism of Binet scale for measurement of, 43; classification of, 231; frequency of, 232; discovering the, 232, 233; heredity and environment as causes of, 233-38; racial origins of, 237; proportion of boys and girls among, 237; mental development of, 238-40; precocity in, 239, 240; physical development of, 240-44; age of walking and talking, 241, 242; growth in height and weight of, 242, 243; school progress of, 244; school accomplishment of, 244-46; specialization of abilities in, 246, 247; scholastic interests of, 247; occupational interests of, 247-49; musical sensitivity of, 249, 250; play interests of, 250, 251; reading interests of, 251, 252; character and emotional stability of, 252-58; testing character of, 252-58; testing social attitudes and trustworthiness of, 254, 255; sex differences in character of, 257, 258; trait ratings of, 258-60; types of school training for, 261-63; choice of teachers for, 263; case studies of, 263-66; special types of, 268; especially in music, 268-73; in music, training vs. capacity of, 270; especially in art, 273-79; with special ability in poetry, 279-88
- Goddard, H. H., diagram of distribution of exceptional children, 8; on parental alcoholism, 19; modification of Vineland-Segin form board, 45, 46; on inheritance of feeble-mindedness, 183, 184; on physical development of feeble-minded, 196-98; in *Journal of Nervous and Mental Disease*, 198 n.; in *American Journal of Insanity*, 300 n.; on inheritance of criminalistic traits, 440; *Feeble-mindedness*, 440 n.
- Goethe, J. W. von, on precocity in children, 240; early evidences of poetical ability, 281
- Gordon, H., study of left-handedness among defective children, 153, 154; in *Brain*, 153 n.
- Gould, G. M., *Right-Handedness and Left-Handedness*, 143 n.
- Gradation, continuous, 3
- Gray Oral Reading Check Tests, in Braille, 384
- Gray, W. S., training of word-blind, 411
- Greene, J. L., *The Cause and Cure of Speech Disorders*, 77 n., 85 n., 103 n., 125 n.
- Griesbach, H., on tactile sensitivity of blind, 392; in *Archiv. f. d. gesam. Physiol.*, 392 n.
- Groszman, M. P. E., study of proportion and distribution of exceptional children, 8, 9; *The Exceptional Child*, 8 n., 444 n.
- Gruenberg, B. C., *Elementary Biology*, 63
- Haefner, R., investigation of hand preference, 144-47; *The Educational Significance of Left-Handedness*, 144 n., 149 n.; study of left-handedness in relation to other traits, 147-53; 149 n.
- Haggerty, M. E., and Nash, in *Journal of Educational Psychology*, 236 n.
- Haines, T. H., work on intelligence tests for the blind, 368 n.
- Hall, G. S., experience with intelligence tests, 58, 59; in *Plain Talk*, 58 n.
- Hand, choice of which to use, 143; training non-preferred, 161-63
- Handedness, forced change in, as secondary cause of stuttering, 86-88; theories of, 130-34; dependence on dominance of one cerebral hemisphere, 132-34; relation of eyedness to, 132-34, 136, 137, 139, 140; tests for discovering native, 137, 138; early predominance of right-, 140; ambidexterity, 141; stuttering and reversal of, 141, 142; study of preference and dominance in, 144-47; study of preference within groups, 144-47; a study of dominance, 156-58; influence of teacher in, 157, 158; feasibility of reversing, 159, 160; methods of reversing, 160, 161; relation of "mirror-writing" to, 168; directions for testing, 175-77
- Handedness, left-. See Left-handedness
- Handwriting, left-handedness and, 154-73
- Harelip, as cause of lisping, 106
- Harshness, as minor speech defect, 118, 119
- Hawthorne, J., on treatment of stuttering by hypnosis, 101
- Hayes, S. P., on psychology of blind, 358, 359; *Ten Years of Psychological Research in Schools for the Blind*, 358 n.;

- 1929 Revision of Binet scale for the blind, 368-71; Provisional Guide for testing the blind, 368 n.; on intelligence of the blind, 371; in *The Teachers' Forum for Instructors of Blind Children*, 371 n.
- Healy, W., on diagnosis of psychoneurotic child, 302; on causes of delinquency, 435-37; *The Individual Delinquent*, 435 n., 439 n.; case study of recurring delinquency in a family, 438, 439
- Healy, W., and M. T., on pathological lying, 320, 321; *Pathological Lying, Accusation, and Swindling*, 320 n.
- Healy, W., and Bronner, study of types of juvenile delinquency, 432-34; *Delinquents and Criminals*, 432 n., 448 n., 449 n., 454 n., 466 n.; on causes of delinquency, 445-47; on physical condition of delinquent children, 447-50; on intelligence of delinquent boys, 454; follow-up study of delinquent children, 466-71
- Healy, W., Spaulding and, study of heredity and delinquency, 437, 438; in *Bulletin, American Academy of Medicine*, 437 n.
- Hearing, in feeble-minded, 189; residual, 337-41. *See also* Deafness
- Height, of feeble-minded, 196-98; and weight of gifted children, 242, 243
- Heine, H., early evidences of poetical ability, 281
- Hemisphere, cerebral, dependence of handedness on dominance of one, 132-34
- Heredity, theories of, 12-28; definition of, 19; atavistic or reversionary, 20; as cause of superior intelligence, 233-38; in relation to musical ability, 272, 273; as cause of deafness, 328; as cause of blindness, 360-64; relation to delinquency, 437-41; relation to epilepsy, 477; in relation to hysteria, 485, 486. *See also* Inheritance
- Hill, F. T., in *Volta Review*, 327 n.
- Hinshelwood, J., on word-blindness, 404, 405; *Congenital Word-Blindness*, 404 n., 417 n.; on frequency of word-blindness, 410; on word-blindness and intelligence, 412; training of the word-blind, 416, 417
- Hoarseness, as minor speech defect, 118
- Hogarth, W., early evidences of artistic talent, 277
- Hollingsworth, L. S., on mental capacity, 39; *Gifted Children*, 39 n., 43 n., 260 n., 261 n.; criticism of Binet scale, 43; on musical sensitivity of gifted children, 249, 250; in *Journal of Educational Psychology*, 249 n.; on musical capacity and general intelligence, 271, 272; *Special Talents and Defects*, 271 n., 418 n.; on characteristics of psychoneurotic child, 304; *The Psychology of Subnormal Children*, 304 n.; and Taylor, diagrams of height and weight of gifted children, 242, 243; in *Twenty-Third Yearbook of the National Society for the Study of Education*, 242, 243, 243 n.; on training of the word-blind, 418, 419
- Holt, E. B., Washburn and, tests of affective sensitiveness, 285
- Home, delinquency in relation to broken, 440, 441, 443
- Horn, J. L., study of school provision for exceptional children, 10-12; *The Education of Exceptional Children*, 10 n., 12 n., 73 n., 75 n., 343 n.; on remedying speech defects, 73
- Hughes, D. E., inventor of audiometer, 337 n.
- Hugo, V., early evidences of poetical ability, 281
- Hunter, W. S., and Sommermeier, in *Journal of Comparative Psychology*, 53 n.; on Lashley's theory of the equipotentiality of cerebral action, 68 n.
- Huxley, T. H., on training of gifted children, 231
- Hydrocephaly, characteristics of, 224; causes of, 224, 225; pathology of, 225; treatment and results, 225
- Hypnosis, treatment of stuttering by, 101
- Hysteria, description of, 484, 485; symptoms of, 485; heredity in relation to, 485, 486; causes of, 486, 487; personality of, 487, 488; prevalence of, 488; age at onset, 488, 489; treatment of, 489-91; epidemics among school children, 491-94; treatment of epidemics of, 494, 495; case study of, 500-02
- Idiot, definition, 209; training of, 209. *See also* Feeble-minded
- Imbecile, definition, 209; training of, 209; theory of delinquent as moral, 441-43. *See also* Feeble-minded
- Imitation, as secondary cause of stuttering, 86
- Immorality, predominance among juvenile female delinquents, 434
- Incendiarism, case study of, 472
- Indians, intelligence scores of American, 53, 54
- Inheritance, theories of, 19-28; Galton's law of ancestral, 20-22; Mendelian

- theories of, 22-28; duplex, 25-27; nulliplex, 25-27; simplex, 25-27. *See also* Heredity
- Injuries, as cause of feeble-mindedness, 186
- Insanity, application of Mendelian theory to expectation of, 27, 28
- Inskeep, A. D., on training of feeble-minded, 206; *Teaching Dull and Retarded Children*, 206 n.
- Instability, nervous, basic cause of stuttering, 82, 84; emotional, 318
- Intelligence, nature of general, 30, 31; measurement of, 31-59; measurement by Binet scale, 31-43; quotient of, 35, 36; validity and reliability as criteria of test of, 37; standardization of test of, 37, 38; growth of, 38-40; average adult level of, 39; testing of different phases of, 44-46; measurement by performance tests, 44-47; group tests of, 47-51; relation to race, 51-55; relation to schooling, 55-57; misinterpretation of ratings of, 57-59; physiological basis of, 59-68; relation to functioning of neurones, 60; relation of left-handedness to, 147, 148; relation of "mirror-writing" to, 168-70; definition of superior, 231; correlation between musical capacity and general, 271, 272; correlation between drawing ability and general, 278, 279; relation of psychoneurosis to, 295, 296; of deaf child, 329-31; tests for blind children, 368-71; relation of word-blindness to, 412-14; relation of delinquency to, 450-57; of epileptics, 477, 478
- Intelligence, superior. *See* Gifted children
- Interests, left-handedness in relation to, 150, 151; delinquency in relation to, 462-64
- Inversion, sexual, 322, 323
- Iowa Medical Journal*, 364 n.
- I.Q., intelligence quotient, 35, 36; constancy of, 38, 40, 41; classification of children on basis of, 38; of rural and city children, 51. *See also* Intelligence
- Irwin, E. A., and Marks, on psychoneurotic child, 292; *Fitting the School to the Child*, 293 n., 309 n.
- Irwin, R. B., work on intelligence tests for the blind, 368 n.
- Italians, intelligence scores of, 54
- Jelliffe, S. E., and White, description of epileptic, 478, 479; *Diseases of the Nervous System*, 478 n., 479 n.; interpretation of epileptic seizures, 483
- Jews, intelligence scores of, 54
- Jordan, H. E., in *American Breeders Magazine*, 139 n.
- Judgment, in feeble-minded, 194; delinquency in relation to moral, 462-64
- Juvenile Braille Magazine*, 385
- Juvenile Braille Monthly*, 385
- Kammerer, experiments in changes of pre-natal environment, 17
- Keller, H., example of deafness and blindness combined, 366; mental life and senses of smell and touch, 393-99; *The World I Live In*, 393, 396 n.
- Kelley, C. M., Wells and, in *American Journal of Insanity*, 300 n.
- Kelley, T. L., on inheritance of criminalistic traits, 440; on physical condition of delinquent boys, 448, 449; *Mental Aspects of Delinquency*, 448 n., 460 n.; on relation of delinquency and school progress, 460
- Kelly, on perceptions of blind children, 394, 395
- Kleptomania, 442; case study of, 471, 472
- Knox, H. A., use of profile test, 46; in *Journal of the American Medical Association*, 46 n.; use of cube test, 47
- Kohs, S. C., use of block design test, 47; *Intelligence Measurement*, 47 n.
- Kuhlmann, F., on constancy of I.Q., 40, 41; in *Journal of Applied Psychology*, 40 n.
- Kussmaul, recognition of word-blindness by, 404
- Lalling, as minor speech defect, 120, 129
- Lamarck, J., theory of inheritance of acquired characteristics, 14
- Lamb, Charles and Mary, as epileptics, 477
- Languages, sound-units lacking in various, 122
- Lapage, C. P., on parental alcoholism, 19; diagram of brain centers, 87; *Feeble-Mindedness in Children of School Age*, 183 n., 199 n., 200 n., 201 n., 203 n., 204 n., 218 n.
- Lashley, K. S., theory of equipotentiality of cerebral action, 66-68; *Brain Mechanisms and Intelligence*, 66 n.
- Lead poisoning, pre-natal effect of, 16
- Leagues for the Hard of Hearing, work of, 353, 354
- Left-eyedness, special reading disability in relation to, 422-25
- Left-handedness, relation of stuttering to, 98-101; prevalence of, 138, 139;

- heritability of, 139; and ambidexterity, 141; degrees of, 143, 144; relation to other traits, 147-54; relation to intelligence, 147, 148; and school achievement, 148; and physical status, 148-50; in relation to interests, 150, 151; in relation to school adjustment, 151; in relation to emotionality, 151-53; prevalence among defective children, 153, 154; and handwriting, 154-73; teaching the child to write, 154, 155; in the teacher, 155-59; and "mirror-writing," 163-73; case study of diagnosis of, 177-79; case study of, 179; special reading disability in relation to, 422-25. See also Handedness
- Lenroot, K., and Lundberg, *Juvenile Courts at Work*, 440, 441 n., 465 n.
- Lewerenz, A. S., tests of innate ability in drawing, 274, 275; *Tests in Fundamental Abilities of Visual Art*, 274 n.
- Lincoln, E. C., in *Journal of Educational Psychology*, 306 n.
- Ling, C., Seashore and, on tactile sensitivity in the blind, 392; in *Psychological Monographs*, 392 n., 393 n.; on acuity of senses in the blind, 393
- Lips, effects on speech of defects of, 120
- Lisping, definition, 103, 104; infantile, 104; correction of infantile, 104; lateral, 105; correction of lateral, 105, tongue-tie as cause of, 105, 106, 128; harelip as cause of, 106; jaw and tooth defects as causes of, 106, 107; high palatal arch as cause of, 107; neurotic, 107; treatment of neurotic, 107; prevalence and severity of, 108; case study of, 109, 110
- Literaphon, device for teaching the blind, 372, 373
- Loeb, on hereditary blindness, 361-63
- Longfellow, H. W., early evidences of poetical ability, 281, 282
- Lord, E. E., Carmichael, and Dearborn, *Special Disabilities in Learning to Read and Write*, 164 n., 171 n., 405 n., 416 n., 419 n.; on training of word-blind child, 416 n., 418
- Lou, H. H., *Juvenile Courts in the United States*, 465 n.
- Lowell, *Visual Acuity Test*, 376
- Lundberg, E. O., Lenroot and, *Juvenile Courts at Work*, 440, 441 n., 465 n.
- Lustig, on pre-natal effect of tubercle bacilli, 18
- Lying, pathological, 320, 321
- Macaulay, T. B., early evidences of poetical ability, 282
- Mangold, G. B., on relation of broken homes to delinquency, 443; *Problems of Child Welfare*, 443 n., 466 n.; on proportion of delinquent children, 466
- Manuel, H. T., *A Study of Talent in Drawing*, 279 n.
- Marie, P., on word-blindness and intelligence, 412
- Marks, L. A., Irwin and, on psychoneurotic child, 292; *Fitting the School to the Child*, 293 n., 309 n.
- Marr, on parental alcoholism, 19
- Marriage, deafness in offspring of consanguineous, 350, 351; blindness in offspring of consanguineous, 362-64
- Masochism, form of sexual pathology, 322
- Masturbation, in normal children and in psychopaths, 321, 322
- Mateer, F., *The Unstable Child*, 301 n., 302 n., 464 n., 465 n.; on delinquent children as psychopaths, 464, 465
- Mathews, E., psychoneurotic questionnaire, 296, 297; in *Journal of Delinquency*, 296 n., 461 n.; test of emotional stability in children, 461
- Mauken, G. H., in *Philadelphia Medical Journal*, 77 n.
- Maxfield, K. E., *The Blind Child and his Reading*, 382 n., 383 n., 385 n., 386 n.
- McCallie, Test for visual acuity, 376
- McCreery, E. L., 70 n.
- McDowell, E. D., *Educational and Emotional Adjustments of Stuttering Children*, 76 n., 90 n., 91 n., 93 n., 96 n.; on prevalence of stuttering, 90; on sex in relation to stuttering, 91; investigation of intelligence of stutterers, 91, 92; investigation of emotional and social adjustments of stutterers, 93-95; study of physical condition of stutterers, 96, 97
- McGarrison, on pre-natal effects of toxins, 18
- McHale, K., *Comparative Psychology and Hygiene of the Over-Weight Child*, 498 n.
- McMurtrie, D. C., in Federal Board for Vocational Education, Bulletin, 162 n.
- Mean, C. D., *The Relations of General Intelligence to Certain Physical Traits*, 241 n.
- Measurement, of intelligence, 31-59
- Medulla, structure and functions of, 63
- Memory, in feeble-minded, 193, 194; auditory, in blind children, 387-91
- Mendel, G., theories of inheritance, 22-28; law of segregation, 24-27
- Meningitis, characteristics of, 227, 228; causes of, 228; pathology of, 228; treatment and results, 228

- Menstruation, disturbance of voice during, 123, 124
- Meyer, A., on word-blindness and intelligence, 412
- Michelangelo, early evidences of artistic talent, 277, 278
- Microcephaly, characteristics of, 221, 222; causes of, 222; pathology of, 222, 223; treatment and results, 223
- Mills, L., on eyedness and handedness, 139, 140; in *American Journal of Ophthalmology*, 139 n.
- Milton, J., Sonnet XXII, 358
- "Mirror-writing," left-handedness and, 163-73; definition, 163, 164; Carmichael's explanation of, 164-66; Baldwin's explanation of, 166, 167; Beeley's explanation of, 167, 168; prevalence of, 168; relation to handedness, 168; relation to intelligence, 168-70; correction of, 170, 171
- Modifications, as type of variation, 19, 20
- Mongolism, characteristics of, 216, 217; mentality in, 217; causes of, 217-21; pathology of, 219; treatment and results, 220
- Moron, definition, 209; training of, 209
- Morrow, L., and Bridgeman, on delinquent girls, 434; in *Training School Bulletin*, 434 n.
- Moses, speech disorder of, 70
- Moving pictures, lack of effect in causing delinquency, 446
- Mozart, W., early evidences of musical talent, 268, 269
- Murchison, C., study of intelligence of criminals, 450-52; in *School and Society*, 450 n.; on intelligence of women criminals, 457; *Criminal Intelligence*, 457 n., 458 n.; study of religion in relation to criminality, 458, 459
- Murdock, K., in *School and Society*, 54 n.
- Murillo, B., early evidence of artistic talent, 277
- Music, sensitivity of gifted children to, 249, 250; children especially gifted in, 268-73; analysis of talent in, 270, 271; differences in elements of sensitivity to, 271; correlation between general intelligence and talent for, 271, 272; inheritance of ability in, 272, 273; case study of ability in, 288, 289; ability of blind in, 387
- Mutations, as type of variation, 20
- Napoleon, as epileptic, 477
- Nasality, as minor speech defect, 119, 120
- Nash, Haggerty and, in *Journal of Educational Psychology*, 236 n.
- National Committee for the Prevention of Blindness, *Publications*, 365 n.
- Negroes, intelligence scores of, 52-54
- Nervousness, proportion of children handicapped by, 7-9
- Neurons, structure of, 60; types of, 61; functions of, 61, 62; relation of intelligence to functioning of, 60
- Newark, N.J., training of deaf-blind child in public school of, 367; *Binet Schools of the Public Schools*, 367
- Newspapers, lack of effect in causing delinquency, 445, 446
- Nomadism, as psychopathic state, 323
- Normality, concept of, 1
- Norsworthy, N., *The Psychology of Mentally Deficient Children*, 193 n.
- Oates, D. W., on left-handedness and stuttering, 99; in *The Forum of Education*, 99 n.
- Occupations, interests of gifted children in, 247-49
- Ohio, *Bulletin of Charities and Correction*, 364 n.
- Oliver, T., study of effects of parental lead poisoning, 16
- Ophthalmia neonatorum, as cause of blindness, 364, 365
- Ophthalmology*, 362 n.
- Ordahl, E. O. and G., in *Journal of Psycho-Astenics*, 191 n.
- Orr, D., on effect of toxemias during pregnancy, 18
- Orr, F. I., Rosanoff and, in *American Journal of Insanity*, 28 n.; in *Bulletin of Eugenics Record Office*, 440 n.
- Orton, S. T., on special reading disability, 421, 422, 425, 426; in *School and Society*, 421 n.
- Otis, M., in *Journal of Educational Psychology*, 301 n.; on intelligence of delinquent girls, 456; in *The Psychological Clinic*, 456 n.
- Overweight child, characteristics of, 498, 499; case study of, 503
- Paralytics, characteristics of, 225, 226; causes of, 226; pathology of, 226, 227; treatment and results, 227
- Paranoid personality, description of, 317, 318
- Parsons, B. S., *Left-handedness*, 138 n., 139 n., 140 n.; on eyedness and handedness, 140
- Paterson, D. G., on education status of deaf child, 330
- Paterson, D. G., Pintner and, *A Scale of Performance Tests*, 46 n.; in *Journal of*

- Educational Psychology*, 329 n.; in *Psychological Monographs*, 329 n.
- Peacham, H., *The Compleat Gentleman*, 268
- Pennsylvania, *Report of Commission to Study Conditions Relating to Blind Persons*, 359 n., 365 n., 386 n.
- Perception, in feeble-minded, 190; of blind child, 393-99
- Performance, measurement of intelligence by tests of, 44-47
- Perkins Institution for the Blind, training of deaf-blind at, 366; tests of pupils in, 387-91
- Perseveration, infantile, 111-13, 127, 128
- Personality, case study of, repressed, 311-13; inadequate, 316, 317; paranoid, 317, 318; hysterical, 487, 488
- Personality traits, of epileptics, 478, 479
- Perversion, sexual, 322, 323
- Peterson, F., in *Journal of Nervous and Mental Disease*, 188 n.
- Physiology, basis of intelligence according to, 59-68
- Pintner, R., use of manikin test, 46, 47; on educational status of deaf child, 330; *Intelligence Testing*, 331 n.; and Paterson, A. *Scale of Performance Tests*, 46 n.; in *Journal of Educational Psychology*, 329 n.; in *Psychological Monographs*, 329 n.; Day, F., and, *A Survey of American Schools for the Deaf*, 338 n., 343 n., 348 n.
- Plasm, germ, 13, 14
- Play, interests of gifted children in, 250, 251
- Poetry, children particularly gifted in, 279-88; examples of early ability in, 279-82; objective tests for ability in, 283-88; characteristics of special talent for, 288; case study of ability in, 289
- Polygon, normal-frequency, 3-6; illustration of frequency, 6
- Porta, *De Refractione*, 130
- Potts, W. A., on pre-natal effect of infections, 18
- Precocity, in gifted children, 239, 240
- Pressey, S. L. and L. W., test for investigating the emotions, 462, 463; in *Journal of Applied Psychology*, 462 n.
- Pressey, S. L., and Thomas, in *Journal of Applied Psychology*, 51 n.
- Preyer, W., *Mental Development in the Child*, 188 n.
- Prodigy, child, 238-40
- Promotion, rapid, for gifted children, 262
- Psychoneurosis, definition, 291, 292
- Psychoneurotic child, description of, 291, 292; psychic characteristics of, 292, 293; symptom complex in, 293; physical characteristics of, 293-95; intelligence of, 295, 296; methods of discovering, 296-307; questionnaire for study of, 296-99; attempts at discovery through findings of various tests, 299-302; discovery through own story, 302; behavior during examination, 302, 303; conflicting opinions on characteristics of, 303, 304; research findings in comparison with normal child, 304-07; treatment of, 307-09; special classes for, 309, 310; case studies of, 310-13; psychopathic child distinguished from, 315, 316
- Psychopathic child, 315-26; description, 315; distinguished from psychoneurotic child, 315, 316; age of onset of trouble in, 316; case study, 323-26; delinquent child as, 464, 465. *See also* Psychopathic states
- Psychopathic states, classification of, 316; inadequate personality, 316, 317; paranoid personality, 317, 318; emotional instability, 318; criminalism, 318-20; pathological lying, 320, 321; sexual psychopathy, 321, 322; nomadism, 323
- Pyle, W. H., in *School and Society*, 54 n.
- Questionnaire, psychoneurotic, 296-99
- Quinan, C., on eyedness and handedness, 140; in *Arch. Neu. and Psychiat.*, 140 n., 154 n.; on left-handedness among mental defectives, 154
- Quotient, intelligence, 35, 36
- Race, relation of intelligence to, 51-55; relation to superior intelligence, 237
- Ramaley, F., in *American Naturalist*, 139 n.
- Raphael, early evidences of artistic talent, 277
- Ratings, intelligence. *See* Intelligence and Tests
- Reading, interests of gifted children in, 251, 252; training blind child in Braille, 277-83; standardized tests adapted for blind, 383-85; supplementary material for blind, 385; ability of blind child in, 385, 386; special disability in. *See* Special reading disability
- Reamer, J. C., in *Psychological Monographs*, 329 n., 330 n.
- Regression, Galton's law of filial, 21, 22
- Reliability, of intelligence test, 37
- Religion, in relation to criminality, 458, 459
- Rembrandt, early evidences of artistic talent, 276, 277

- Rennett, study of effects of parental lead poisoning, 16
- Reproduction, theories of, 12-14
- Retardation, definition, 495; frequency of, 495; causes of, 495, 496; remedial procedure for, 495, 496; case study of, 502
- Révész, G., *The Psychology of a Musical Prodigy*, 270 n.
- Reynolds, J., early evidence of artistic talent, 277
- Rife, J. M., in *Psychological Review*, 144 n.
- Roques, study of effects of parental lead poisoning, 16
- Römer, F., in *Fortschritte der Psychologie und ihrer Anwendungen*, 193 n.
- Root, A. R., on prevalence of stuttering, 90; in *Elementary School Journal*, 90 n., 91 n., 92 n.; on sex in relation to stuttering, 91
- Rorschach, test of imagination, 287
- Rosanoff, A. J., application of Mendelian theory to expectancy of mental disorders, 27, 28; *Manual of Psychiatry*, 27 n., 315 n., 316 n., 319 n., 485 n., 486 n., 487 n., 488 n.; on criminalism, 319, 320; on inheritance of criminalistic traits, 440; description of hysteria, 485; on heredity in relation to hysteria, 485, 486; on causes of hysteria, 486, 487; on the hysterical personality, 487, 488
- Rosanoff, A. J., and Orr, in *American Journal of Insanity*, 28 n.; in *Bulletin of Eugenics Record Office*, 440 n.
- Rosen, E., *A Comparison of the Intellectual and Educational Status of Neurotic and Normal Children in Public Schools*, 304 n.
- Rows, R. G., on effect of toxemias during pregnancy, 18
- Rubens, P. P., early evidence of artistic talent, 277
- Sadism, form of sexual pathology, 322
- Sandiford, chart of Wedgwood-Darwin-Galton family, 234
- Scheidemann, N. V., in *Pedagogical Seminary and The Journal of Genetic Psychology*, 156 n.; and Colyer, in *The Journal of Educational Psychology*, 158 n.
- Schmitt, C., in *Elementary School Journal*, 405 n.; on word-blindness, 409, 410, 417
- Schoedel, J., in *Jahrbuch für Kinderheilkunde*, 492 n.
- School, left-handedness and achievement in, 148; left-handedness in relation to adjustment in, 151; progress and accomplishment of gifted children in, 244-46; delinquency in relation to achievement in, 460
- Schooling, relation of intelligence to, 55-57
- Schools, provision for exceptional children in city, 9-12; training of gifted children in, 261-63; education of blind children in public, 371, 372; epidemics of hysteria in, 491-95
- Schools for deaf children, residential and day, 343-48; increase of public day, 347, 348; occupations of graduates of public day, 348; trades learned in, 348, 349
- Scott, W., early evidences of poetical ability, 282
- Scripture, E. W., on prevalence of stuttering, 90; *Stuttering and Lipping*, 90 n., 107 n.; on neurotic lipping, 107
- Scripture, Mrs. E. W., on remedying speech disorders, 72, 73; in *Quarterly Journal of Speech Education*, 72 n.
- Scripture and Clark, on the epileptic voice, 479; in *Proc. New York Neurol. Soc.*, 479 n.
- Searchlight, juvenile magazine in Braille, 385
- Seashore, C. E., musical sensitivity tests, 249; tests of musical talent, 271; *The Psychology of Musical Talent*, 271 n.; audiometer as used by, 336
- Seashore, C. E., and Ling, on tactile sensitivity in the blind, 392; in *Psychological Monographs*, 392 n., 393 n.; on acuity of senses in the blind, 393
- Segregation, Mendel's law of, 24-27
- Seitz, *Test for visual acuity*, 376
- Seizures, epileptic, 479-82
- Sensations, in feeble-minded, 189
- Senses, impairment of, in feeble-mindedness, 188, 189; cutaneous, in feeble-minded, 189; acuity of, in the blind, 387-400
- Sex, speech defects in relation to, 72; prevalence of stuttering in relation to, 91; feeble-mindedness and instincts of, 189; relation to superior intelligence, 237; relation of word-blindness to, 411, 412; intelligence of delinquent child in relation to, 456, 457; relation to outcome of delinquent child, 467
- Sexual psychopathy, 321, 322; eroticism, 322; exhibitionism, 322; sexual frigidity, 322; sadism, 322; masochism, 322; sexual inversion, 322, 323
- Sherlock, E. B., *The Feeble-Minded*, 141 n., 164 n.
- Shock, as secondary cause of stuttering, 84, 85

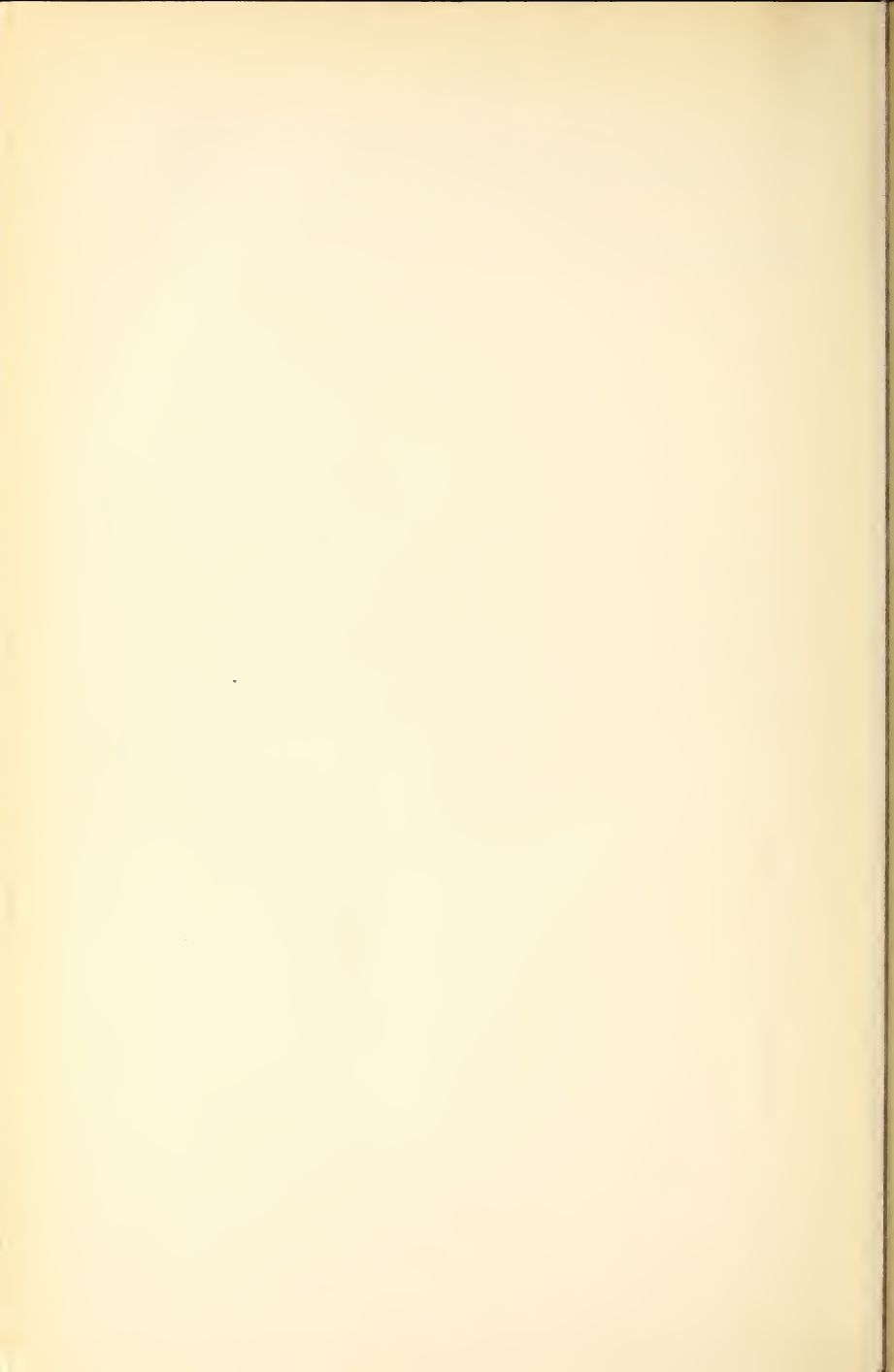
- Shuttleworth, G. E., on pre-natal effect of infections, 18
- Simon, work with Binet on intelligence scale, 31
- Sims, V. M., investigation of variability of I. Q. in normal and psychoneurotic children, 306, 307; in *Psychological Clinic*, 306 n.
- Skewness, of frequency curve, 5
- Small, M. H., in *Pedagogical Seminary*, 491 n.
- Smedley, F. W., *Report of U.S. Commissioner of Education*, 141 n.
- Sommermeier, E., Hunter and, in *Journal of Comparative Psychology*, 53 n.
- Sound-units, substitutions of, 113, 144; omissions of, 114; lacking in various languages, 122
- Southey, R., early evidences of poetical ability, 279
- Spaulding, E. R., and Healy, study of heredity and delinquency, 437, 438; in *Bulletin, American Academy of Medicine*, 437 n.
- Spearman, C., on nature of intelligence, 30; *The Nature of Intelligence and the Principles of cognition*, 30 n.
- Special reading disability, nature of, 419-21; neurological explanation of, 421, 422; in relation to left-handedness and left-eyedness, 422-25; remedial procedure for, 425, 426
- Speech defects, proportion of children handicapped by, 7, 8; school provision for children handicapped by, 10-12; major, 70-110; prevalence of, 70-72; in relation to sex, 72; remedial procedure for, 72-74; degree of success in remedying, 73-75; organization of work for correction of, 75, 76; stuttering, 76-103, 108, 109; lisping, 103-10; baby stuttering, 89; lisping, 103-10; baby talk, 111-13, 127, 128; minor, 111-29; due to carelessness, 113-16; cluttering, 116; monotonous voice, 117, 118; hoarseness and harshness, 118, 119; nasality, 119, 120; thickness, 120; lalling, 120, 129; foreign accent, 120-23, 129; of mental defectives, 123, 203-05; periodic voice disturbance, 123, 124; falsetto voice, 124, 125; diagnosing and remedying, 126, 127
- Sports, result of mutations, 20
- Stability, tests of emotional, 255-57; delinquency in relation to emotional, 460-62
- Stammering, definition of, 76. *See also* Stuttering
- Standardization, of intelligence test, 37, 38
- Stanford Achievement Test in Reading, in Braille, 384
- Stanford-Binet scale, summary and diagnosis of, 32-35; revision and extension of Binet-Simon scale, 32-36; findings suggestive of psychoneurosis, 299, 300
- Stanton, H. M., on inheritance of musical ability, 272; in *Psychological Monographs*, 272 n.
- Stealing, predominance among juvenile male delinquents, 431, 432
- Stecher, L. I., Baldwin and, on constancy of I.Q., 41; *Mental Growth Curve of Normal and Superior Children*, 41 n.
- Stedman, L. M., *Education of Gifted Children*, 264 n.
- Stelzner, H., on treatment of psychoneurotic children, 307, 308; *Die Psychopathischen Konstitutionen*, 307 n.
- Stephenson, S., on frequency of word-blindness, 410
- Stier, *Linkshandigkeit*, 164 n.
- Stigmata, in feeble-minded, 198-201; of ear and eye in feeble-minded, 199-201
- Stoner, W. S., case history as gifted child, 264
- Stories, influence on delinquency of pernicious, 446, 447
- Stratton, G. M., Brown and, on tactile sensitivity of the blind, 392, 393; in *Journal of Experimental Psychology*, 392 n.
- Strong, A. C., in *Pedagogical Seminary*, 52 n.
- Stumberg, D. *See* White, D. S.
- Stutterers, intelligence of, 91; school achievement of, 92; ratings on language and non-language intelligence tests, 92; emotional and social adjustments of, 93-95; trait ratings of, 95; physical condition of, 96, 97
- Stuttering, definition of, 76; symptoms of 76, 77; former methods of treatment for, 77, 78; theories as to cause of, 78, 79; auditory amnesia theory of, 79, 80; Freud's theory of morbid anxiety and fear as cause of, 80-82; basic cause of 82-84; secondary causes of, 84-89; shock as secondary cause of, 84, 85; nervous debility as secondary cause of, 85; imitation as secondary cause of, 86; forced change in handedness as secondary cause of, 86-88; carelessness as secondary cause of, 88, 89; age of onset, 89; faulty motor habits as secondary cause of, 89; speech conflict as secondary cause of, 89; prevalence of, 89-91; prevalence of, in relation to sex, 91; corrective procedure for, 97-102; re-

- lation of left-handedness to, 96-101; treatment by hypnosis, 101; non-consequential factors in, 102; reversal of handedness and, 141, 142; case study of, 108, 109
- Sunny, D., in *School and Society*, 53 n.
- Swift, E. J., *The Psychology of Childhood*, 58 n.
- Symptom-complex, in psychoneurotic child, 295
- Synapse, nature and function of, 62
- Syphilis, effect on germ plasm, 18; relation to feeble-mindedness of parent's, 184, 185; as cause of blindness, 364 n.
- Tactual sensibility, of blind children, 390-93
- Taft, J., on the neurotic child, 308, 309; in *Proceedings of the International Conference of Women Physicians*, 308 n.
- Talk, baby, 111-13, 127, 128
- Talking, age of, in children of varying intelligence, 241, 242
- Tasso, early evidences of poetical ability, 280
- Taylor, G. A., Hollingworth and, diagrams of height and weight of gifted children, 242, 243; in *Twenty-Third Year Book of the National Society for the Study of Education*, 242, 243, 243 n.
- Teacher, left-handed, 155-59; influence in handedness, 157, 158; of gifted children, 263
- Tennyson, A., early evidences of poetical ability, 279, 280
- Terman, L. M., development of *Stanford Revision and Extension of the Binet-Simon Scale of Intelligence* under, 32-36; classification of children on basis of I.Q.'s, 35; *The Measurement of Intelligence*, 35 n., 181 n., 182 n., 232 n., 235 n., 237 n., 302 n., 456 n.; on value of different types of intelligence test, 44; *Genetic Studies of Genius*, 93 n., 150 n., 240, 258; definition of feeble-mindedness, 181, 182; definition of superior intelligence, 231; on frequency of superior children, 232; on inheritance of superior intelligence, 235, 236; *The Intelligence of School Children*, 241 n., 244 n., 245 n.; on abilities and interests of gifted children, 244-48, 250-52; tests of character, 252-58; trait ratings of gifted children, 258-60; on relation of feeble-mindedness and delinquency, 456, 457; and Cuneo, in *Pedagogical Seminary*, 306 n.; and Fenton, in *Journal of Applied Psychology*, 282 n.
- Test, profile, 46; manikin, 46, 47; Knox cube, 47; Kohs block design, 47; *Army Alpha*, 45-50; *Army Beta*, 50, 51; dot-fixation, for native eyedness, 134, 135; paper-hole for native eyedness, 134, 136; for deafness, 355, 356
- Tests, validity and reliability as criteria of intelligence, 37; standardization of intelligence, 37, 38; measurement of intelligence by performance, 44-47; group, 47-51; results of *Army Alpha*, 52, 56, 57; misinterpretation of results of intelligence, 57-59; for musical ability, 270, 271; for abilities in visual art, 273-75; attempts at discovering psychoneurosis through findings of intelligence, 299-307; association, findings suggestive of psychoneurosis, 301; performance, ratings of psychoneurotic children on, 301, 302; of intelligence in blind children, 365-71; of visual acuity, 374-76; standardized reading, for blind children, 383-85; of vision in school, 397-400. *See also* Intelligence
- Thiemich, *Deutsche Med. Wochenschr.*, 188 n.
- Thomas, C. J., on frequency of word-blindness, 410; training of word-blind, 418
- Thomas, J. B., Pressey and, in *Journal of Applied Psychology*, 51 n.
- Thompson, diagram of law of ancestral inheritance, 21
- Thorndike, E. L., criticisms of Binet scale, 42; in *Psychological Review*, 42 n.; on types of intelligence, 44; on inheritance of criminalistic traits, 440; *Educational Psychology*, 440 n.
- Thyroid, relation to cretinism, 213, 215
- Tiegs, E. W., and Crawford, *Statistics for Teachers*, 4 n.
- Tongue-tie, as cause of lisping, 105, 106, 128
- Tonsils, effect on voice of enlarged, 118, 119
- Toxemias, effects of, in pre-natal environment, 18
- Toxins, effects of, in pre-natal environment, 18
- Trachoma, as cause of blindness, 365, 366
- Trait ratings, of stutterers, 95; of gifted children, 258-60
- Tregold, A. F., on parental alcoholism, 19; *Mental Deficiency*, 185 n., 192 n., 194 n., 205 n., 214 n., 216 n.; on treatment and cure of cretinism, 215, 216
- Truancy, study of causes of, 444, 445; case study of, 473, 474
- Tuberculosis, effect on germ plasm, 18;

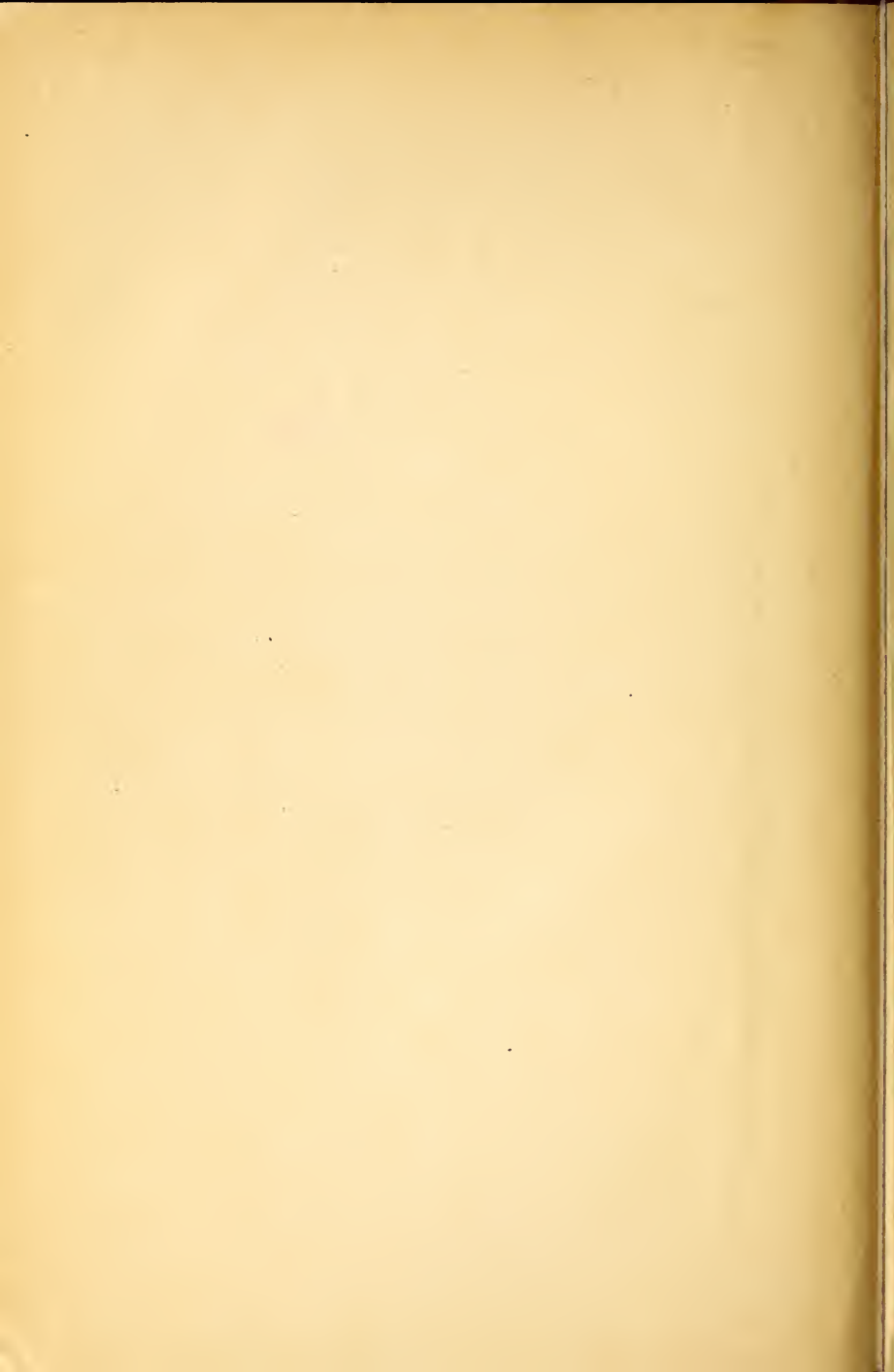
- relation to feeble-mindedness of parent's, 184, 185
- Tuke, Warner and, on extent of undernourishment, 497
- Undernourishment, as cause of feeble-mindedness, 187; definition of, 496, 497; extent of, 497; symptoms of, 497; causes of, 497, 498; remedial procedure for, 498; case study of, 502
- Underweight child, characteristics of, 499
- U.S. Dept. of the Interior, Bureau of Education, *Cardinal Principles of Secondary Education*, 206 n., 207 n.; *Schools and Classes for the Blind*, 359 n.
- U.S. Public Health Service, *Report*, 365 n.
- Uvula, effect on voice of elongated, 118
- Validity of intelligence test, 37
- Van Dyck, A., early evidence of artistic talent, 277
- Variations, continuous or slight, and discontinuous or "sudden," 19, 20; progressive, 20; retrogressive, 20
- Vision, monocular, 134, 135; binocular, 135, 136; in feeble-minded, 188; classes for conservation of, 373; tests for, 373-76; minor defects of, 377; school tests for, 397-400; case study of limited, 400, 401. *See also* Blindness
- Vocations, training of blind child in, 386, 387
- Voice, monotonous, 117, 118; periodic disturbance of, 123, 124; falsetto, as minor speech defect, 124, 125; eunuchoid, 125 n., 126 n.; of the epileptic, 479
- Volta Review*, magazine for the deaf, 354, 355
- Wagner, W. R., lack of early evidences of musical talent, 270
- Wainwright, T., as "born offender," 441, 442
- Walking, age of, in children of varying intelligence, 241, 242
- Wallin, J. E. W., in *School and Society*, 71 n., 90 n., 91 n., 98 n., 108 n.; on age of onset of stuttering, 89; on prevalence of stuttering, 90, 91; on sex in relation to stuttering, 91; on left-handedness and stuttering, 98, 99; *Clinical and Abnormal Psychology*, 182 n.; *The Education of Handicapped Children*, 184 n., 214, 218 n.; on causes of Mongolism, 218, 219; on word-blindness, 409; on frequency of word-blindness, 410, 411; *Studies of Mental Defects and Handicaps*, 411 n., 413 n.; on word-blindness and sex, 411, 412; on word-blindness and intelligence, 412-14
- Warburg, on frequency of word-blindness, 410
- Warner and Tuke, on extent of undernourishment, 497
- Warren, H. C., *Human Physiology*, 61, 62
- Washburn, H. E., and Holt, tests of affective sensitiveness, 285
- Weeks, D. F., Davenport and, on causes of epilepsy, 475, 476; in *The Journal of Nervous and Mental Disease*, 475 n., 476 n.; study of inheritance of epilepsy, 477
- Weight, of feeble-minded, 196-98; and height of gifted children, 242, 243; characteristics of children in relation to over- and under-, 498, 499
- Weismann, A., theory of heredity, 13, 14
- Weller, C. V., study of pre-natal effects of lead poisoning, 16
- Wells, F. L., *Mental Tests in Clinical Practice*, 301 n.; and Kelley, in *American Journal of Insanity*, 300 n.
- White, D. S., objective tests of poetical ability, 283-88; in *Journal of Experimental Psychology*, 283 n.
- White, W. A., Jelliffe and, description of epileptic, 478, 479; *Diseases of the Nervous System*, 478 n., 479 n.; interpretation of epileptic seizures, 483
- Wilde, O., *Intentions; Pen, Pencil, and Poison*, 441 n.
- Will, in feeble-minded, 194, 195
- Williams, J. H., study of intelligence of delinquent boys, 452-54; in *Journal of Delinquency*, 452 n., 456 n.
- Wilms, in *Deutsche Medizinische Wochenschr.*, 215 n.
- Wilson, D., on early prevalence of right-handedness, 140
- Wilson, S. A. K., in *Journal of American Medical Association*, 488 n.
- Woods, T. D., on extent of undernourishment, 497
- Woodworth-Cady Questionnaire, 255
- Woodworth, test of psychoneurotic symptoms, 461
- Woolley, H., and Ferris, case study of word-blind child, 407, 408, 417, 418; *Diagnosis and Treatment of Young School Failures*, 407 n.
- Word-blindness, congenital, 403-28; definition of, 404; pathology of, 404, 405; causes of, 405-10; frequency of, 410,

- 411; case studies of, 407, 408; 426-28; relation to sex, 411, 412; relation to intelligence, 412-14; general visual perception in, 414-16; training to overcome, 416-19; special reading disability as mild form of, 419-26
- Worry, types of children's, 152, 153; delinquency in relation to, 462-64
- Wright, J. D., *The Little Deaf Child*, 335 n., 337 n.
- Writing "mirror," 163-73
- Wundt, W. M., on word-blindness and intelligence, 412
- Yerkes, R. M., *Psychological Examining in the United States Army*, 52 n.









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325.

